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GREAT ROUTES OF THE SAHARA, PAST AND FUTURE:

A paper read at the Evening Meeting of the Society on 19 December 1932, by

H.R.H. PRINCE SIXTE OF BOURBON

THE object which I have had in mind for my African explorations has been an eminently practical one. I have turned my attention to the study of the great routes of the Sahara and the entire African continent, which appear to me to constitute for France, my country, one of the essential problems involved in the full development of our African Empire. Since you have done me the honour of inviting me to deliver a lecture before this illustrious Society of yours, to the labours of which geographical research all the world over is so much indebted, I ask your permission to speak on the subject I have referred to: a subject which may have some interest for you, inasmuch as one of the principal colonial problems of France will thus be dealt with by a Frenchman. Moreover, as you will see, the interests of Great Britain, and indeed of the entire world, are closely involved in this problem.

Maréchal Lyautey, whom we in France look upon as the perfect man of action and of reflection, in addressing the African Society in London which had conferred upon him its great gold medal, said two years ago "that he felt at home in that Society, since all who take an interest in the transoceanic countries speak the same language and have the same conceptions and the same aims. Their effort is a constructive one: it brings order, peace, and progress into what was previously anarchy, disorder, stagnation, and barbarism." It is the same reason which will cause me to speak to you without any reticence and without any *arrière-pensée*. Indeed, how would it be possible to conceive of a great civilizing enterprise in Africa unless it be in harmony and co-operation with all the white nations established as rulers on that continent. Firmly persuaded as I am of the immense superiority of the white race, I, for one, have always advocated the union of all white people in Africa into a veritable League of White Nations on the Black Continent.

The first and the most urgent problem that faces every colony and Africa in its entirety, is the problem of communication by water, by land, and by air. This problem has become all the more urgent as the means of locomotion have developed in these last few years, and notably aviation has given a magnificent

demonstration of its possibilities. Not so very long ago one used to compare Africa to a dish of which only the border had been touched. You might say equally well that the white men have penetrated into this continent like eels. Coming from the sea, they have travelled up the rivers; but, less adroit than the fish I mentioned, they were held up for a long time by the tidal waves, and then by the rapids, trade along these natural channels of penetration being thus hindered. The history of Africa serves to emphasize this truth, that the sea is not a means of approach, but, on the contrary, seems to obstruct the access to the coasts. There are but few points where these are naturally accessible, in the estuaries of the great rivers. Thus the mouth of the Senegal was occupied in 1364 by some sailors from Dieppe who were succeeded eventually by a Rouen trading company which prospered as a result of the support given to it by Cardinal Richelieu. The other estuaries were occupied by the British naval forces, as part of a far-sighted policy directed towards the occupation of the essential points on the great sea routes.

France, on the other hand, holds in Africa a position which you might call primarily a continental one, springing from the fact of her possessions in the north of Africa. The diverse colonies which form the French African Empire all link up with one another. They have been grouped into two great administrative sections, that of the Afrique Occidentale Française and that of the Afrique Equatoriale Française. One of the first beneficent results of this measure has been to break the particularist tendencies of each colony and to establish a scheme of intercommunication: previously each colony had an egotistical tendency to live by herself and for herself. This organization has had the greatest success. That is why we are endeavouring to establish a closer union between Northern Africa (Algeria—Tunis—Morocco) and Central Africa. You will see before long that the general idea of transafrican communications draws its inspiration from ever wider conceptions, encompassing within a common bond the principal European interests in Africa.

Let us see then which these lines of African penetration are, taking as our natural starting-points our respective capitals, London and Paris. The first stage is Northern Africa. This is really the point of departure and the natural basis for the conquest of the South. From Algiers three great routes descend towards the land of the sun. That of the centre, which we might call the Sudan route, descends almost in a straight line to the basin of the Niger. It is the shortest line between Algeria and the Afrique Occidentale Française: and for this reason, perhaps, the line chosen for the Trans-sahara Railway. In the west, we have the Mauretanian route, which, once order has been restored in Tafilelt and Rio de Oro, will avail itself of the Saura valley and the old caravan route which runs along the Hank and ends up in Atar and Saint Louis du Sénegal.

The third route is that of the Congo, the only one of the three which, in the full sense of the term, deserves to be called a transafrican one, not only because running across the French, English, and Belgian colonies it serves the international interests of Central Africa, but also, because linking up with the Belgian and English railway and aviation routes it reaches the Cape. This is an "Algiers-to-Cape" route, which joins the Cape-to-Cairo route established by you; thereupon it forks across the Congo towards the east, and runs in the

The canyons of Tibesti

'Ain Galaka, about 50 miles west of Faya

Dance of Sara warriors at Fort Archambault

Borku dancers at Faya

directions of the Indian Ocean and of Madagascar respectively. Finally, there is a fourth direct route from Tunis to Lake Chad, forming with the Congo route one of the great corridors of access to the centre of Africa.

Apart from the direct route across Mauretania from Algiers to Dakar, I have had occasion to travel by motor car along the other routes and also the good fortune to make the first motor journey, in 1929, from Algiers to Lake Chad, by Ahaggar and Air, and in 1932 to make the descent from Tunis to Bilma, subsequently exploring the geographical basin of Lake Chad, Tibesti, Borku, Ennedi, Ubangi-Shari, returning eventually by British Nigeria and the French colony of the Niger. Let me say a word on each of these routes.

The Mauretanian route, at the moment in a sense replaced by the air-line Toulouse—Dakar *via* Morocco, is intended not only to connect Dakar, the capital of the Afrique Occidentale (consisting of seven colonies) with the Mother Country, but also to connect France as quickly as possible with South America. It is hence a trans-sahara route before it becomes a transatlantic one —not a transafrican one.

The Sudan route is the one most frequently referred to, as it is the one along which the first crossings of Sahara have been done by aeroplane and motor car; and also because it is along this route that careless tourists go astray regularly, thus giving much trouble to the French authorities, and much joy to the newspapers. I may add, having myself travelled along this route, that you need a strong dose of foolhardiness and neglect of the existing regulations in order to lose your way on this route, seeing that it is served by a permanent postal motor service. This is the line which some obstinate people would like to see followed by the Trans-sahara Railway. I confess I am one of them, though my personal preferences are in favour of the aeroplane. This Sudan route will open up communication with the enormous sweep of the Niger, which once the Sahara has been crossed becomes in a way the hinterland of Algeria. Thus at all events I for one envisage the future of this district.

The third route, that of the Congo, is the one which I much prefer, not only because it is picturesque and runs across magnificent landscapes, and because it is easy for the aeroplane and the motor car; but because it fulfils most perfectly the conditions and the purpose of a trans-sahara route. It begins at the Mediterranean, either at Algiers or Tunis, it does not matter which, since both these points are practically at the same distance from Paris, and therefore from London or Brussels. The two forks of the route from Algiers or Tunis meet before reaching the Ahaggar. The route then descends, roughly in a north-to-south direction, to the French Colony of the Niger and British Nigeria. Zinder in French territory, Kano in British territory, will be the respective air ports. Kano in particular, with its important net of roads and railways and its numerous and rich population, requires a quicker connection both for mails and passengers than the steamer running from Lagos to Liverpool.

When, in a very short time, aviation has reached a reasonable commercial development, and when the aeroplane can fly night and day, but preferably by night, then Kano will be barely two or three days' journey from London. From Kano I see our aeroplane continuing its flight over the north-east corner of Nigeria, then the British Cameroons, the French Cameroons, the French

colony Ubangi-Shari, and the Belgian Congo. An understanding with the Belgians having been foreseen for a fairly long time, there is nothing to prevent Léopoldville being in direct connection with Brussels, just as Kano is with London and Bangi with Paris. From the Belgian Congo one would then envisage a line to Madagascar. In this fashion a completion in the west would be obtained for the great Cape-to-Cairo line of which England is so justly proud and on which lately an air service has been established. At the essential points the British Cape-to-Cairo line would be linked up with the Franco–Congo–Madagascar line.

There remains, finally, to be noticed the direct Tunis-to-Chad line, along which I travelled in January and February of this year. On the basis of observations made by my expedition M. Louis Bréguet had sent into Wadai in advance of us an aeroplane piloted by Costes. Having spent some time in the south, where we had the opportunity of enjoying very fine sport—indeed I personally had the very rare good fortune of shooting two buffaloes from the aeroplane—we went up to Fort Lamy. At this stage the aeroplane, flying over Lake Chad and Sahara, having been held up by sandstorms at Bilma, reached Tunis without any difficulty. The proof was thus supplied that, without any other preparation than a first reconnoitring of the route, it was possible to do a non-stop flight from Lake Chad to the Mediterranean.

Here we have, then, two great transafrican routes—the Cape-to-Cairo route, a British line; and the Route Algiers or Tunis–Congo–Madagascar, which is a Franco-Belgian line, with English participation so far as Nigeria is concerned.

A moment ago I directed your attention to Dakar, which is at once the seaport and the airport best placed in relation to South America. It seems very natural therefore to investigate a line which, running from Dakar to the east has its terminus at the Red Sea. That has been done in many stages, and quite recently and during my stay in Africa, in a particularly brilliant fashion by M. d'Estailleur Chanteraine, piloting his aeroplane and linking up Dakar with Jibuti by means of a flight which offered no difficulties, except in the region of the Abyssinian mountains. You may also regard Port Sudan as the terminus of the route from Dakar, and in that case touch Khartoum, leaving Abyssinia entirely aside. Such a line which for 85 per cent. of its extent would be within French territory, and subsequently within Anglo-Egyptian Sudan, would not only link up two oceans across a continent, but would be the junction between the great mail line Europe–South America at Dakar, and the two transafrican lines, French and British respectively, in the region of Lake Chad and at Khartoum. On reaching the Red Sea, it would link up and merge with the great French, English, and Dutch lines, which bring passengers and mail to India, China, and the Far East. You will recognize, then, that the ensemble of the great French transafrican routes, as we conceive them, has an eminently intercolonial character. That is, destined naturally to create a close link between France and her colonies, these routes could serve the same purpose with regard to England and Belgium.

I have explained to you, ladies and gentlemen, the object which governed our expedition. Now I must not omit—since you have been so good as to ask

On the banks of the Yobe

Sara fishermen about to start on a fishing expedition on the Shari

The arrival of the expedition in Agadez

Crossing the dunes of the "grand Erg oriental" on the return journey

me to do so—to tell you something about my journey across this Eastern French Sahara.

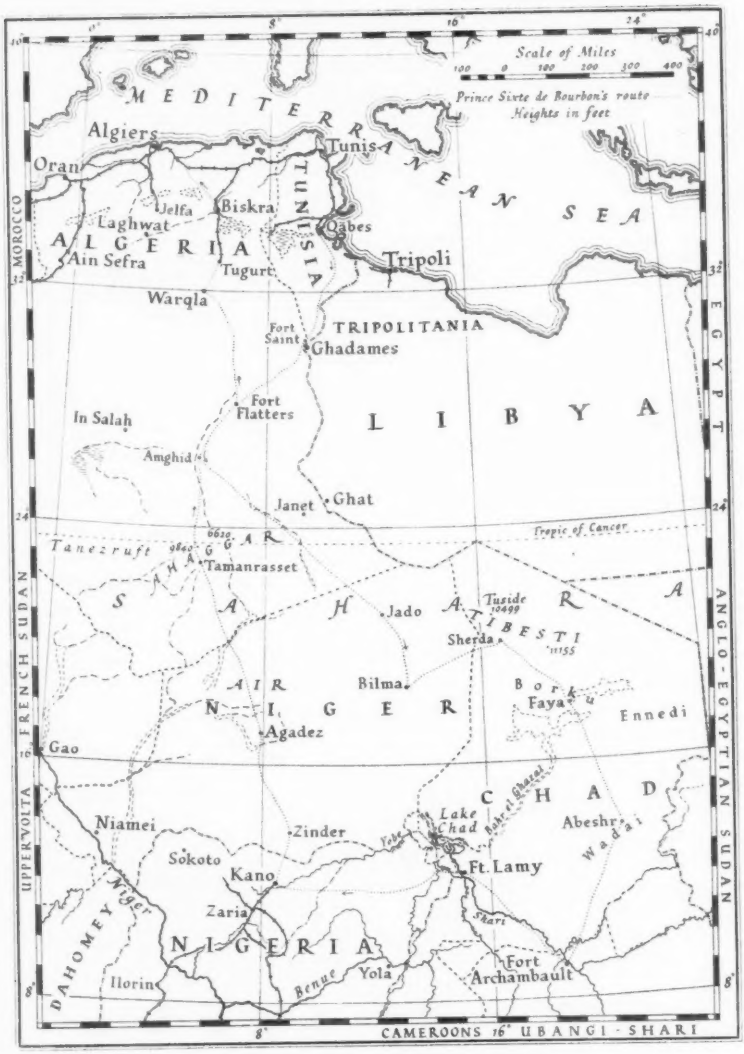
First a word as to the personnel of the expedition. The expedition consisted of Commander the Comte de Bearn, late of the French Navy, Lieutenant the Comte de Neufbourg of the French Air Force, Captain Bruneau of the French Tank Corps, M. Norrie, our geologist, a film photographer, and an engineer mechanic.

I now come to the motor cars. They were some solidly built 14-h.p. Delahayes, much geared down and equipped with tyres of very great thickness. These cars gave us full satisfaction, which is not to say that we did not have some difficulties. We were under the necessity of travelling for great distances without being able to get fresh supplies of water or food; many thousands of kilometres had to be covered without finding petrol, hence we were obliged to load our cars very heavily—up to a weight of about 8000 lb. With such a weight we inevitably sank in the sand, notably between Tibesti and Wadai, when we had to cross an uninterrupted succession of large sandy spaces and dunes. In order to extricate ourselves we had some plates of steel, solid but fairly light, measuring 4 feet to 1½ feet, which were placed under the wheels when the car got stuck in the sand, and which made it possible to get it out easily. Only, when you have to repeat this procedure thirty to forty times in a morning, you end by finding such an exercise unbearable.

The entire expedition covered some 9000 miles. We left Tunis on January 3. Across the whole of Tunis and Southern Algeria you travel along fairly good roads, and every now and then military posts occur. There is therefore no danger if you travel taking reasonable care. We followed in this fashion the general outline first of Tunis, then of Algeria, and arrived south of Tripoli, when there began the really new part of the journey, hitherto untried by the motor car.

First came the journey across the great Ténèré, an absolute sand desert, which stretches between the rocky massifs of Ahaggar and Air and the great cliff which, forming to some extent the frontier of the Tibesti, runs from Bilma to Tripoli. In the whole of this immensity there is but one really inhabited spot, Bilma, a French military post under the command of a captain. It contains palm groves, salt-pits, quantities of water, and quantities of mosquitoes. From there we continued in an eastern direction in order to journey in a vast semicircle, round the basin of Lake Chad. We steered in fact by compass in a territory which is extremely little known. Thus at Bilma it was only possible to find one single person who had ever been to Tibesti. We had to grope our way and lose much time; but how exciting and interesting it is to try to find one's way across the dunes, across the rocks, proceeding on foot for I do not know how many kilometres ahead of the first car.

We took five days to reach Tibesti, and during the three last days we had the satisfaction of seeing in the distance the lofty blue mountains of Tuside which rise to an altitude of more than 3000 metres. The imagination of the Tuaregs of the desert has peopled Tibesti with djinns and fairies. I must regretfully confess that if Tibesti is a country of great beauty on account of its extraordinary mountain scenery, it is entirely bereft of witches, devils, or fairies. The Tubus who inhabit Tibesti are little lean fellows, lazy, good



Prince Sixte's Route across the Sahara

fighters, undisciplined, and provided with heads as hard as the basalt or the lava of their extinct volcanoes. They have a sultan whom nobody obeys, and they live generally split up into quite small tribes. The French captain stationed at Bardai is really their head. Having first by strong measures inculcated respect, he now inspires the natives with confidence. Naturally he has forced them to give up their guns, which they put to very bad use, for they shoot very poorly even when aiming at white people. Now they have only their swords and their spears—even the women carry swords. They are just as independent as their husbands and very much resemble the Tuareg women, who have absolutely nothing in common with the Arab women: for the Tubu, like the Tuareg, is monogamous and the marriages are only contracted by really mutual consent, which does not mean that they are much happier in consequence, although in general these women are very faithful. It happens sometimes that a Tubu, seized with a desire to wander, leaves his miserable hut some fine night and disappears. After three or four years he comes back, if he has not died *en route*. His wife, whom he has not troubled to warn, is waiting for him Sometimes she has remarried: in that case if the first husband returns, it means the death of the second. At other times it is the woman who creates difficulties for her husband. Thus, quite recently, the Sultan at Bardai, having become a widower, remarried, choosing a very beautiful young woman. He himself is over sixty, which is an extreme old age for these parts. What was bound to happen did happen, and one day the poor Sultan, unable to bear it any longer, got violently angry with his wife. This led to serious complications, for the Sultana went straight with her sword to cut off the head of the Sultan's favourite camel, and then, skilfully setting fire to her husband's home, she waited to see it burn down, and thereupon returned to her tribe. And what do you think the Sultan did? He ate his camel, built up his house again—and a fortnight later the Sultana came back, her little sword under her arm, just as if nothing had happened.

The volcanic country is splendid. There are deep canyons enclosed within basalt walls, high extinct craters, springs of hot water and boiling mud. The cold is keen, but there is never any snow, so little damp is there in the air; and almost the whole year there is a north-east wind to drive away the clouds. As to animals, you will find mouflons, wild dogs, and wild asses; and at lower altitudes, the usual fauna of gazelles, antelopes, bustards, hyenas, and jackals.

Our motor cars had succeeded in reaching the military post of Sherda. From there it was impossible to continue into the mountains by car. We now mounted camels in order to penetrate into the interior. From Tibesti we then continued by car in an easterly direction, and the whole time following unknown routes, as far as Borku, of which the capital—if you may use such a grandiloquent expression of an agglomeration of just under a thousand natives—is Faya. Situated on the extreme edge of an oasis which is about 70 kilometres long, this locality is extremely rich in water underground, its level being reached about 1 m. 50 cm. below the surface of the earth. As a result, the French officers in the military posts have got magnificent vegetable gardens, where even the vine has been acclimatized and gives abundant crops.

We now had to proceed to Wadai. As to this route the official maps are silent. We therefore engaged the services of two native guides, who knew the

country a little more than ourselves, but not very much more. The first half of this distance is made very difficult on account of an immense agglomeration of sand-dunes across which it is necessary to find passages while continually travelling zigzag fashion. The second part then becomes easy, for the steppe succeeds to the sand, and on the approaches to Wadai the vegetation becomes very dense. The country abounds in game, such as ostriches. Having reached Abeshr, the ancient capital of Wadai, we found ourselves on familiar ground where very good roads have been constructed by the French military and civil authorities. At this point we met, as arranged beforehand, Costes the famous transatlantic flyer. It was through Wadai that we descended to Fort Archambault, in the Ubangi-Shari, where we could make a diversion from the tiring work of exploration by hunting.

Having returned to Lake Chad, we traversed the northern part of the British Cameroons and Nigeria. From there our return journey took place *via* Aïr and Ahaggar to Algiers and Tunis. I am happy here to be able to express my gratitude for the reception which was given us everywhere by the British authorities, and also to testify to our admiration for the civilizing work which has been accomplished by them. I had once before been to Kano, three years ago. Since that time this very great native city has been cleansed and supplied with drinking water and electric light; the roads have been improved, bridges constructed, the railway lines lengthened. It is really a fine and noble work which has here been undertaken.

I remember how three years ago I had a long conversation with Mr. Palmer, a British governor, on the subject of the methods of administration which differ so much in the French and the English colonies. In Northern Nigeria, for instance, all the Sultans and Emirs have kept their power, though, to be sure, guided and counselled by the British Residents. In the French colony of the Niger, on the contrary, all the Sultanates have been abolished, except in the Tuareg Aïr, and the administration is exercised direct through the French officials. I for one think that there is, at the moment, something to be said for each system. The results are good in both cases; but it is only after fifty years, when two new generations of natives have grown up and benefited by these administrations, that it will be possible to draw a conclusion. The French apply the system of the Protectorate in Morocco, in Tunis, and in certain parts of Indo-China. These are special cases, and it would be impossible in colonial matters to establish rigid rules. Systems of government must be adapted to the population, to their history, to their ancient customs, and to their characters. There is no greater difference than that, say, between a native of the Chad district and a Senegalese, a Moor, or an inhabitant of the Equatorial Forests. Hence you must first of all try to understand the natives in order to rule them.

The present crisis makes itself intensely felt in most of the provinces, and if there are not too many workless, this is due to the fact that the traditional laziness of the negroes makes for a disposition to furnish as little work as possible. Our first task is however to force them to increase the output of victuals for their own consumption, the native wheat, the palms, rather than export products like cotton or ground nuts. Generally, the negroes eat too little, and hence the race has become a weak one and the infantile mortality is

enormous. The activities of the medical services and of the Prophylactic Institutes, which I have watched both in the British and the French colonies arrive at results of extreme interest and increase in efficiency every day. From this point of view, one may say that the Colonial Powers fulfil their duty towards the indigenous populations. Hence—if one excepts the results of the world crisis, which we hope will be only transitory—it is a favourable and encouraging impression which one brings back from this part of Africa lying to the north of the Equator.

Our two nations, yours and ours, are the two greatest Colonial Powers in the world. They can, above all, point to a long past, to generations of Colonial officials who have a tradition and a doctrine. I think I may say without vanity that we may be proud of the work done and full of confidence in the future.

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: French exploration and geographical research has always been the source of great admiration both in this country and in this Societv. Politics, as you know, are not discussed in this Society, but geography, which we regard as a universal science, we consider in all its aspects. It is quite true that the whole aspect of the Sahara, its physical features, climate, peoples, has yet to be written; and there I quote one of our own countrymen who I am sorry to say is prevented by illness from being present to-night, Mr. Francis Rodd. There are Frenchmen who have devoted their time and their work to the study of North Africa: explorers like Major Lamy and Ferdinand Foureau, who made that great journey across from Algeria to Zinder; and administrators like General Laperrine, who lost his life in the desert; and that great man Marshal Lyautey, who is an Honorary Member, I am proud to say, of this Society and whose influence extended far beyond that country of Morocco to which he was accredited so long as Resident-General. And then that romantic figure Charles de Foucauld, who gave his life for his faith at the gates of Tabankort.

To-night we are to hear of the Sahara from H.R.H. Prince Sixte of Bourbon. His Royal Highness is a traveller and observer who has made use to the full of modern methods both of travel and of record. Having served with distinction in the War, first of all, I may say, as a private, he spent many years in the Sahara, and he will tell us of it in a lecture which I now invite him to deliver.

H.R.H. Prince Sixte of Bourbon then read the paper printed above, and a discussion followed.

The PRESIDENT: We have with us Mrs. Patrick Ness, who has been across on one of the routes. I will ask her if she will kindly speak for a moment or two.

Mrs. PATRICK NESS: I feel it is a great honour to be asked by our President to speak for a few moments to-night and, if I may be allowed to do so, I should like to begin by thanking Your Royal Highness for the extraordinarily interesting paper which you have read, for the very beautiful photographs, and also for the amazingly good film you have shown. I am perhaps able to offer thanks with more genuine appreciation, seeing that I have visited Lake Chad, as well as many other parts of Africa, and crossed the Sahara. The photographs of the Shari river, which is at the south of Lake Chad, remind me of some of the country I saw, though I approached Lake Chad through British territory.

It is not however to Lake Chad that I am going to devote the few moments allotted to me. Since the title of the lecture is "Great Routes of the Sahara" I

should like to speak of one of those routes, the one I used on my return from Lake Chad, one which undoubtedly is quite the best known but which has not actually been described to-night. It is the development of that route which I think may be of interest: the route which goes from Gao on the south edge of the Sahara to Regan on the north edge, through 807 miles, 682 of which are without water. A few years ago it would have taken about two months to cover that route, but it can now be traversed in two days and two nights, cars having superseded camels. Although these mechanical vehicles are not so picturesque as are the camel caravans, yet there is still some romance about the conquest of that route, a conquest which has been made by the French.

It was in 1916 that cars were first used to any considerable extent in that part of the Sahara, and then they covered 750 kilometres to In Salah. In 1917 and 1918 five cars reached In Salah with two expeditions, one of which was under General Laperrine, who continued for 300 kilometres into the desert. In 1919 six armoured cars went 3000 miles into the desert. Encouraged by that, General Laperrine in 1920 took thirty-two cars into the desert, assisted by aeroplane, and it was on that expedition that he met his death so tragically after a forced aeroplane landing in that part of the desert known as the Tanezruft or the land of thirst. So far only ordinary wheels had been used in the desert, but in 1922 Citröen caterpillar cars attacked the desert and arrived at Tesalit. In 1923 Citröen caterpillar cars again attacked the desert and this time travelled from Algeria to Timbuktu and back. So the desert was conquered by mechanical means. But the conquest did not stop there, for in 1924 the Mission Gradis crossed with six-wheeled cars from Colomb-Beshar to Burem on the Niger, travelling by the more circuitous route on which there was water at intervals. There is now a service of six-wheeled cars across the Sahara, run by the Cie. Générale Transsaharienne, following a shorter and almost waterless route between Regan and Gao. It was that route I used on my way back from Lake Chad a few years ago, but I travelled across in a four-wheeled car with two drivers, one French and one native, myself the only passenger. By dint of travelling night and day and by stopping only for food and to dig ourselves out of the sand at not infrequent intervals, we accomplished the journey of 807 miles in forty-six hours. That route, ladies and gentlemen, has now been traversed in the inside of a night, for over it Mrs. Mollison flew on her flight to and from the Cape, which ended so magnificently on December 18.

The PRESIDENT: Any one who has the time or the opportunity to read what we think is a somewhat entertaining book, written by Dr. Mill, 'The Record of the Royal Geographical Society,' will find that he speaks of the horror with which, many years ago it is true, some of the older Fellows of the Society looked upon the introduction of even lantern slides at our lectures. They felt it was rather like reducing a lecture to the status of a Sunday school. Then came the cinema, and you have shown us to-night, sir, what admirable use can be made of that. But I can assure you that to-night for the first time in this hall we have had physical movement accompanied by music; and if you will be so kind as to allow me to be quite frank with you, I think I may say a shadow of doubt passed through the minds of some as to whether that was really geographical activity. But I do not see why not. I know I have on other occasions in this hall remarked that the correct interpretation of the word geography is a description of the history of the Earth and the people who live in it; and not only the people but all living things. At any rate, sir, you have added greatly to our interest this evening.

What is of great interest—and if Mr. Rodd could have been with us I should have asked him to have spoken of it, for it requires some temerity on my part to speak of it among many who know a great deal about the subject—is to note the routes that our lecturer has spoken of and to compare them with what were,

until a short time ago, six great trade routes which came across the desert from north to south, starting from Timbuktu: one going a little westward and then to the north; another almost due north. Then the one we heard about through Gao, a fourth that came from Burem up to the north, to the coast near Oran, the fifth up from the Sudan, and, finally, what is known as the forty-day route—I do not talk Arabic and it would be a pretension on my part to speak of it otherwise than by that name.

His Royal Highness has fulfilled all we hope for in our evening lectures in giving us a most admirable description of places even now little known. We know very well in this Society what it is to be the leader of an expedition, and though our lecturer has treated very lightly the various difficulties and hardships, perhaps, that he and his colleagues went through, we know very well that on him rested the responsibility. We are most deeply grateful to him for coming over here to speak to us to-night and for describing in so delightful and, if he will allow me to say so, modest a way his experiences. I ask him formally to accept, on behalf of this large audience and the Royal Geographical Society, our most warm and hearty thanks. He will allow me to thank also the Columbia Graphophone Company for the trouble they have taken in reproducing for us his records of native music.

THE LAND OF THE TEBBUS

JOSEPH F. ROCK

KANSU, the north-westernmost province of China, appears bleak and desolate, especially when approached from the east. The soil is composed of fine, powdered grey loess. The arid aspect of the land, due to a sparing rainfall, the absence of trees, the dreary mud hovels, usually with flat roofs, which serve as dwellings; all these present a rather sordid picture. No one would dream that such a poor dreary province should harbour in its south-western region a paradise second to none perhaps in the whole of China. A great limestone range, known as the Min Shan, separates this oasis from the rest of Kansu.

As if to fortify this most romantic of all oases of the Chinese hinterland, the Tao river acts as a deep moat surrounding the crenelated castle battlements represented by the Min Shan, behind which lies Tebbu Land. The Min Shan, extending from east to west, is composed of fantastic limestone crags cut into huge turrets and pinnacles. A deep cleft in its central part forms the famous Shi Men, or rock gate, a landmark visible far and wide. Its northern slopes are cut into numerous deep valleys, densely forested with spruces, firs, and rhododendrons, which debouch into the Tao river. The ridges and spurs separating these valleys are often themselves sharply crenelated and resemble huge sleeping dragons who guard Tebbu Land.

There are really three approaches to this land through long valleys which have their sources in the Min Shan. The easiest approach is through the valley of Kadja to a pass called Kwangke by the Choni people and Konke by the Tebbus. One must not however suppose that once this pass is reached Tebbu Land lies before one's gaze. There remain to be negotiated vast gorges and rock gates where an army could be held at bay by a few. The Tao river, the natural moat of Tebbu Land, has its source in the vast grasslands west of another mighty limestone range called Luichawrak, which fantastic mountain mass it has cut in half. The Tao river encircles nearly the entire northern slopes of the Min Shan, and is at once the divider of beauty from desolation and of lawlessness from order. These wild Tebbus that inhabit the most romantic spot of all China will perhaps remain an ethnological riddle; they call themselves Tewu, and are divided into two or perhaps three clans known as the Upper or Shan Tebbu, the Lower or Ha Tebbu, and the most refractory of all, the Tara Tebbu. They are akin to the Tibetan race, but from my studies of the many tribes inhabiting western China I have come to believe that the Tebbus, the Hsifan or Chrame tribe, the Chiarung, Nyarung, and the Nahi, or Moso, are of one stock, namely, the great Chiang race who numbered over 250,000 families, and whose kingdom once was in the Koko Nor. Early Chinese records report that their territory lay south of a line from the Lop Nor to the great wall. Another branch of the Chiang mentioned in the Chinese histories are the Ti, and it is very likely that the Tewu belonged originally to the Ti branch, spoken of as the Ti Chiang. The Chinese characters employed to write their tribal name are Tieh Pu, meaning "iron cloth," but these serve as phonetics only, having been selected to imitate the Choni name for them, which is Tebbu. There are ten thousand of these warlike people belonging to

Looking up the Tsalu Ku towards the Shi Men

Approach to the Shi Men or rock gate of the Min Shan

Looking south across the main range of the Min Shan: Shi Men in centre background

the Tebbu tribe who were under the rule of the Choni Prince, who had his seat in the hamlet of Choni, on the Tao river. The earliest historic Chinese records preserved in the Shu King, the so-called bamboo books, because the records were engraved on bamboo staves, a bundle of so many staves making a page, tell us of the accomplishments of the great Yü of the Hsia Dynasty, in the classic called Yü Kung, "The Tributes of Yü."

It is this emperor who mentions the wild tribes of the West, calling them the San Miao or the three Miao tribes who inhabited the headwaters of the Tao river. This emperor must be considered as the first Chinese explorer. In the above classic we are told of his visiting the Hsiking Shan, which is none other than the Luichawrak of the Tibetans. He regulated the headwaters of the streams, and tells of his approach to the Tsishi Shan, which is the ancient Chinese name of the Amnyi Machen. Interpreters of this classic in the Shu King believe however, and I concur in their opinion, that the Hsiao Tsishi Shan, or small Tsishi Shan, must have been meant, for he states they floated down the Yellow River from the base of that mountain. It would be impossible to float down the Yellow River from near the Amnyi Machen on account of the terrific currents, gorges, defiles, and endless rapids which must have existed even in Yü's time, who ruled 2204–2196 B.C. The small Tsishi Shan is near the present city of Hochow (Kansu), whence the Yellow River is navigable.

That he did visit the Hsiking Shan is an indisputable fact. Even to-day the political borders of actual China are far to the east of the Hsiking Shan, and Yü must have been the first to explore that wild region which in his day was still farther west from the borders which were then China. On my journeys to and from Radja on the Yellow River I looked in vain for the Hsiking Shan, for present-day maps give that mountain to the north of the Htsechu river, where we found grasslands only. The Hsiking Shan is to the south of the Htsechu, and forms the divide between that river and the headwaters of the Tao. An old Chinese work on the rivers of Tibet and China gives a description of the Hsiking Shan and of the headwaters of the Tao river, and gives also the Tibetan name for it transcribed in Chinese phonetics. Chinese sounds are not well adapted to transcribe names in foreign languages, but the Tibetan name for that mountain, which is Luichawrak, is easily recognizable in its Chinese garb, which is Lochapula. This and the description given identifies the Hsiking Shan, which, until our surveys, was located on modern maps about 80 miles too far north. The large stream shown on these maps as entering the Htsechu near its northern knee does not exist, and in fact the Htsechu has only small tributaries, none as large as given on the maps.

Emperor Yü also visited the northern slopes of the Min Shan in what is now Kansu, but there is no record of his crossing it into what is now Tebbu Land. The Min Shan is not far from the Luichawrak range, and although grasslands intervene between these two ranges, they belong to one system, being of the same formation. And yet the Tebbus cannot always have been the sole possessors of this wonderful oasis, for ancient records tell us that between the years of 557 and 581 of our era there was built a city called Tiehchow in what is to-day upper Tebbu Land, which was then ruled over by a Chinese viceroy. The city was later abandoned but re-established during the Tang

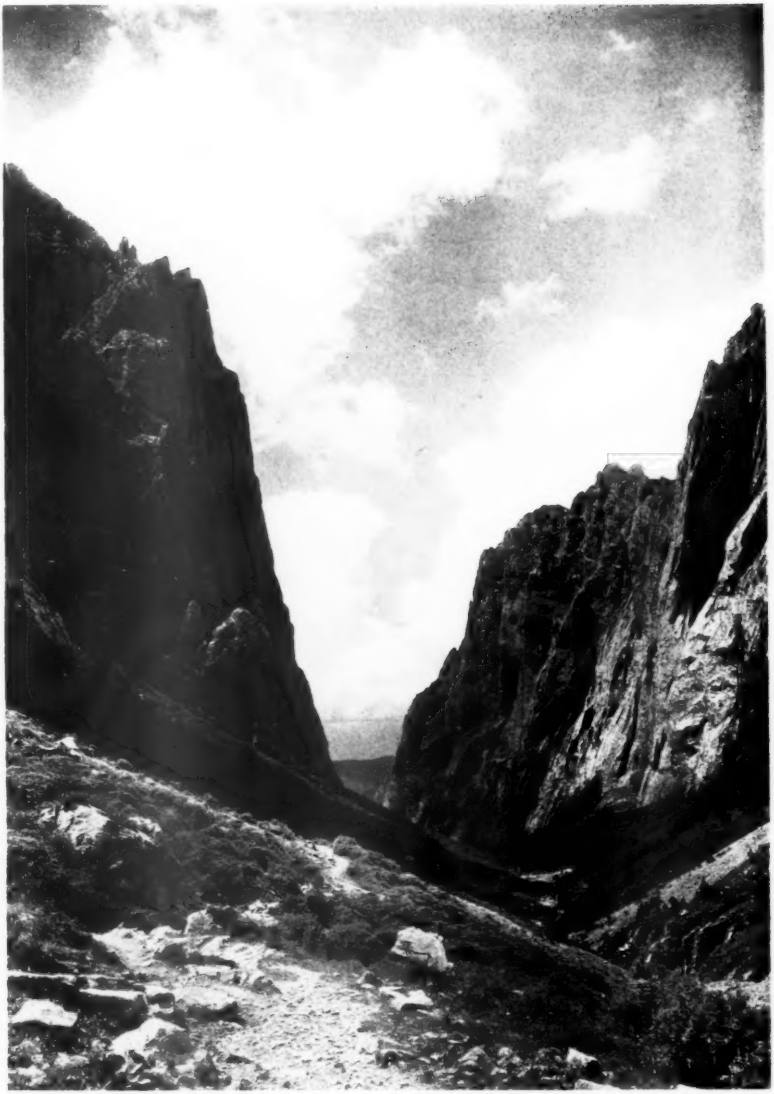
Dynasty between A.D. 627 and 650. Remnants of its ancient walls and moats exist to this day, and would undoubtedly be of great interest to archaeologists, were excavating feasible, but the great stumbling-block of such an undertaking would be the Tebbus, and especially the hostile Tebbus of that region. To-day Tebbu Land is practically closed to foreigners and Chinese alike, and he risks his life indeed who enters that forbidding natural fortress which the Tebbus claim for their own.

It was while waiting for auspicious times to explore the Amnyi Machen that I undertook the exploration of Tebbu Land, which necessitated five separate journeys during which we circumambulated the entire Tebbu country twice, and explored all its valleys and mountains. The Min Shan proper is one long limestone range and is the divide between the Yangtze and the Yellow River. Chinese geography is rather vague in defining the Min Shan; various other ranges to the south of it and not in Kansu, but in the province of Szechwan, are also called Min Shan, and are considered a part of the Kansu range. This is erroneous, for nothing can be more distinct than the Kansu Min Shan, which to the north is encircled by the Tao river, and to the south by the Peishui Kiang, a branch of the great Kialing, which branch has two sources, one in the grasslands of Szechwan at Datso Lhamo, and one in the great Min Shan. United they flow through Tebbu Land, which in fact is one long valley hemmed in by the Min Shan to the north and a barrier range to the south which separates it from the grasslands of Szechwan.

The actual southern border of Tebbu Land, and at the same time the Kansu–Szechwan border in Choni–Tebbu territory, is the Yangpu Shan or Dakhe La of the Tebbus. In former days Tebbu Land extended however to the junction of the Hei and Pei Ho, three days' journey south of the present boundary. The north-westernmost town in Szechwan is Sungpan, situated on the Min river, two days south of its source, which has its rise on a mountain called the Konke La, and which Chinese geographers also include in the Min Shan, but which is far to the south of the Kansu range of that name. South of the Dakhe La rises another river called the Hei Ho, or Black River, which, some days' journey farther south, joins the Pei Ho, which is another branch of the Peishui Kiang. The former joins the latter as the Wenhsien Ho 40 li west of the town of Pikow, in south Kansu. All present maps of this region are incorrect, as they give the junction of these two rivers to the east of Pikow. Some distance south this river joins the Kialing, in Szechwan. From Hochow, some 90 li from Chungking, where the Kialing joins the Yangtze, the river is navigable by steamers.

The Tebbu country, which formed the largest part of the Choni prince's domain, was ruled by him more or less successfully. The Tebbus remained independent and ignored the prince as far as possible, even attacking his emissaries and twice myself and an escort which was sent by the Choni prince for our protection.

The ancient principate of Choni is no more, both physically and politically speaking, for the former Choni prince, whose ancestors ruled that country for nearly six hundred years, was shorn of his rank and all his titles by Feng Yuhsiang and was appointed commissioner of the barbarians. This was in the winter of 1927; in April 1928 the Muhammadans rebelled and rose against



Looking south through the limestone gorge of the Min Shan, leading to Drakana

View from the summit of the Kwangke pass (12,550 feet)

the Red régime of Feng Yuhsiang, slaughtering the Chinese, of whom they killed two hundred thousand. They came to Choni, looted and murdered, killed the lamas of the peaceful Choni lamasery, and burnt both the lamasery and Choni village to the ground, leaving behind them death and destruction. The Choni prince fled into Tebbu Land, from where he wrote me a long letter telling me of the terrible destruction and calamity the Muhammadans had inflicted on him and on his people. The Tebbus themselves remained unmolested, for no one dared attack Tebbu Land.

The Choni prince ruled over 12,750 families, or a total of approximately 63,750. With the exception of the Tebbu, the Tibetan population under Choni rule was nearly wiped out during the last Muhammadan rebellion. It may be of interest as a matter of record to enumerate the different tribes over whom the Choni prince used to rule in the good old days. They comprised the Shang Yi in the north of Choni, the Hso Kwa (probably the Drokwa of the Tibetans) in the west, the Tala and Tiehpa in the south, and the Heifantze or black barbarians to the south-east near the town of Kaichow or Wutu. Those living in the Tao valley were called the Choni Tzu or Choni clan, probably a mixture of Kansu Chinese and Tibetans. In the south live also the Tzu Pa Tzu, and in the east the La Pu Shi. Another smaller tribe lived near the hamlet of Showa, near a lake to the north-west of Lienhwa Shan; they were called the Chang Ye. The Tebbus form however the largest tribe and comprise nearly ten thousand members, being restricted to the southern slopes of the Min Shan.

The Choni prince's domain, owing to the absence of proper methods of measuring distances in li, miles, or square miles, was reckoned fourteen days' journey from north to south, and ten to twelve days from east to west. To take a census of the wild Tebbus would be exceedingly difficult, if not impossible, owing to the prevailing lawlessness and hostility of the tribe, and the wild mountainous region they inhabit, which is only accessible for a few months of the year. There are no roads, and the trails are next to impassable, as, for instance, the trail leading from Peiju to the boundary of the lower Tebbu country. The trails are purposely kept in a very bad state of repair by the Tebbus to prevent their neighbours from making raids on them—that is to say, one Tebbu village against the other—and the traveller will often find barricades across such trails as do exist between villages, as a possible safeguard against attack.

The easiest approach to the upper Tebbu country is by way of Kadja valley, which debouches into the Tao river valley 45 li, or 15 miles, from Choni. This is the western approach to Tebbu Land. There is one other approach by way of Chaba Ku, a valley about 20 miles beyond Kadja Ku, but the journey is lengthened by about three days. Kadja Ku is the only valley which extends to the top of the Min Shan without a break, excepting the long valley of Chaba Ku. The quickest route to the lower Tebbu country is by way of Tayü Ku, a valley which extends to the village of Adjuan, distant 90 li, or 30 miles, from Choni. From Adjuan a valley called Hsiao Ku leads south-east to a difficult pass called Tsarekika, but here one is only on the top of the main Min Shan, and there remain still two other passes to negotiate before reaching Tebbu Land, the journey taking five days from Choni.

Sketch-map showing Dr. Rock's explorations around the borders of Kansu and Szechwan

Another approach is from Minchow, in southern Kansu, by way of the valley of the Peishui Kiang, a branch of the Kialing. In the west the Tebbu country may be reached from the grasslands east of the knee of the Yellow River, inhabited by lawless nomads; one of the approaches being by way of the valleys Tsaru Ku and Tsoru Ku, notorious for their inhabitants, whose only occupation, besides attending to their flocks of sheep, is robbing and murdering. The safest approach remains by way of Kadja Ku from the Tao river, and it was through this valley that we made our first journey to Tebbu Land.

Our object in exploring Tebbu Land was threefold: botanical, ornithological, and geographical. Only very few people had visited parts of the Tebbu country before my first visit. One was a missionary, who paid a short visit to Drakana; another was General George Pereira, who entered southern or lower Tebbu Land from Szechwan, but did not cross the Min Shan in the Choni prince's territory; he followed the Peishui Kiang to Shuipi, the last village in lower Tebbu Land, and thence crossed the Tala Shan in Chinese territory to Minchow and thence by the Tao river route to Choni. Mr. C. Emery, an American, crossed the Min Shan over the Tsarekika pass in the east on his way to Sungpan. No one had ever made the entire circuit and crossed all the passes which lead in and out of Tebbu Land except ourselves. We paid several visits at different seasons and in addition explored the backbone of the Min Shan as well as its southern and northern valleys.

The first Tebbus who came under my observation were arraigned in the courtyard of the Choni prince Yamen. There were six of them, all chained together by their necks. They were from lower Tebbu Land, tall, gaunt-looking dark men like Hungarian gypsies. When I inquired if they were robbers, their guard said "Oh no." On further inquiry I learned that I was indirectly responsible for their plight. Some months previously I had given to the Choni prince seeds of vegetables and melons which the Department of Agriculture of Washington had sent me. The melon seeds he had sent to the lower Tebbu country to be planted, as the climate is much milder, and these poor wretches were to take care of them, and when ripe were to bring them to Choni. Having never seen a melon they allowed them almost to rot on the vine ere they sent them to the Choni prince. This enraged the feudal lord, and forthwith he had them brought to Choni in chains to have them punished for their seeming negligence. It may be here remarked that he could do this with the more peaceable Lower Tebbu, but never with the indifferent haughty Upper Tebbu.

The Start for Tebbu Land

On 8 June 1925, after exasperating delays with the caravan and endless talk of the muleteers about the weight of the loads, we finally left Choni with a caravan of mules supplemented by six donkeys—a local product, as it was difficult to persuade Kansu muleteers to go so far off the beaten track. We followed the beautiful valleys of the Tao river with its magnificent groves of ancient poplars with huge spreading crowns and trunks several feet in diameter, past little Tibetan hamlets until we reached the mouth of the valley of Kadja, where we were ferried across the Tao river to the hamlet of Tatsutong. Here,

at the banks of the Kadja stream, at the foot of a steep spur densely forested with pine trees (*Pinus tabulaeformis*), we pitched our camp. The meadows in the Kadja valley adjoining the beautiful forest of birches, wild pear, and apple trees were full of gorgeous flowers, of which the most handsome were lovely wine-coloured primulas and cushions of purple Pedicularis, violets, and others too numerous to mention. The undershrub in the deciduous forest which merged into the pine forest confined to the steep ridges, comprised roses, several species of barberry, honeysuckles, wild peonies, wild cherries, all in the gorgeous bloom of spring. In a large grove of tall spruces a Tebbu caravan had pitched camp, which simply meant that they had made a large log fire around which they sat.

A glorious morning found us striking camp. We followed upstream through beautiful groves and forests of spruces, across large meadows alive with wild pheasants, which were however more numerous in the fields of wheat and barley near the villages. We met Tebbus in their poor sheepskin garments, and lamas riding yak, wearing their peculiar white summer headgear resembling a saucepan. About 10 miles farther up the valley narrowed into a beautiful defile, the stream roaring through its narrow bed, surging among the boulders crowned with a beautiful species of Juniper (*Juniperus distans*). After passing several villages, such as Shiluna and Warruna, nestled peacefully against the forested valley slopes, we came to the last hamlet in Kadja valley, called Kadja Yaru. Beyond this little village is wilderness.

We pitched camp somewhat beyond on a beautiful meadow through which the Kadja river flowed. The meadow, bordered by wonderful forest, was one sea of flowers; here cream-coloured and deep purple primulas, large-flowered Incarvilleas, red wild poppies (*Meconopsis*), and purple-flowered rhododendrons vied with each other. What a contrast when, nearly two years later, I again camped at this spot, but in midwinter: the stream frozen, and in order to pitch tents we had to shovel snow which lay 2 feet on the ground. No bird was then about, and everything slept the deep sleep of winter, for the temperature was then 10 degrees below zero Fahr. But this was spring, and filled with the spirit of adventure I could hardly wait to reach the crest of the Min Shan with the wealth of alpine flowers which, as I knew, must await me there. Leaving Chüchüdzong, our camping place, my men and I, the Choni guides, and Tibetan soldiers which the Choni prince had kindly provided, marched ahead, leaving the muleteers to their weary job of tying on the loads. To our left, immediately beyond our camping place, we forded a lateral stream which issued from a narrow rocky valley called Tsalu Ku. My guides informed me that by following this stream up the valley one could reach the very foot of the famous Shi Men, or rock gate, the most conspicuous landmark of the Min Shan range, and visible from any promontory north of the Tao river. The grandest view I ever had of the whole Min Shan was from the cliffs over 11,000 feet in height behind Angkur Gomba, a monastery in the Choni prince's territory, two days' journey north of Choni.

The Great Rock Gate

At the mouth of Tsalu Ku we met a lama riding horseback who had come from the Kwangke pass, and to make certain of the trail I hailed him and

motioned him to stop. As he spied the rest of my armed force he fled post haste back up the valley, whence he had come, as fast as his horse could carry him. One of my escorts galloped after him to persuade him that all was well and that we were peaceful people. He then returned, but kept at a safe distance, and when I laughed at him he realized his mistake, for he had thought us brigands. He directed us on our way, but as the trail is not well defined and crosses the stream again and again, we hailed a Tebbu boy whom we met farther up the valley driving two yak, and persuaded him to guide us up the valley. After travelling 7 miles we reached a small hamlet, all forsaken save for a single woman leaning over the village fence and chatting with a Tebbu boy, who might have been making love to her. Beside her was tied a huge Tibetan mastiff who tore at his chain and raced about the shaky post. When we arrived the dog became still more furious, and if the woman had not quickly taken hold of him, he would certainly have buried his fangs into one of us. The Tibetan mastiff is indeed a formidable breed and a most dangerous adversary. Our Tebbu boy who had guided us this far refused to go any farther, and when I tried to cajole him and took hold of his sleeve he shed his garment like a snake its skin and vanished naked into the forest, while I held in my hand a single cloak.

We finally persuaded the other Tebbu boy to join us, but he too was frightened, though later, after a little coercion and the promise of good pay, he came back with us. But he was exceedingly suspicious, continually looking back at my men and surveying carefully their cartridge belts and shotguns. Fear overwhelmed him, and he stopped and said he had no time to continue farther as he had to milk his yak. This brought forth a roar of laughter, for no male Tibetan would stoop to such degrading work, which is always left for the women to perform. Finally, to allay his fear, our escort gave him a rifle to carry, which instantly restored his courage, while a dollar pressed into his hand allayed all suspicion.

We reached a lovely meadow immediately in front of a fine Shi Men or rock gate, but not the main one, which was still some 4 miles on. It was the preliminary gate to the main backbone of the Min Shan range. From my tent, set in a sea of flowers, I beheld a defile cut by a tiny stream which at times can be a fierce torrent, with walls 1000 or 2000 feet in height, the grassy slopes and cliffs forested with fir, spruces, and rhododendron. The valley of Tsalu Ku itself was a mass of golden yellow flowers (*Potentilla fruticosa*), and near our camp at 11,000 feet elevation red, blue, and yellow poppies (*Meconopsis*), with lovely primulas and edelweiss, grew in plenty. Our Tebbu guide, who had now lost all fear, stayed with us all night and guided us next day to the main rock gate. The trail leads into a defile with overhanging walls of limestone rock, the strata being vertical in places. It was cold and chilly in this weird winding canyon only about 30 feet wide, but nearly 2000 feet deep. From the gorge one emerges into an open valley which leads southwest directly to the great Shi Men in the very backbone of the Min Shan, at the foot of which, below a tiny lake, we pitched our camp. On each side of the rock gate extend huge rock buttresses, forming massive walls, the home of hundreds of snow pigeons (*Columba leuconota gradaria*). Along the stream, which has its source to the right of the rock gate below a pass, were lovely alpine meadows,

boggy, but covered by handsome tall senecios. Our camp, on a meadow surrounded by fir and spruce forest and gorgeous rhododendrons, was 11,750 feet above sea-level.

We decided to climb into the big gate, which we estimated to be 300 yards wide at the base, and 600 at the top; the thickness of the rock we guessed at 1200 feet. We climbed 1500 feet above our camp into the chasm over a perilous rock slide. Enormous boulders lay about, beside which we looked like pygmies. There is no outlet into Tebbu Land through this rock gate, for one is baulked by a steep crescent-shaped talus slope and scree, which it is impossible to scale, for one step into the loose mass brings down an avalanche of rock. The walls and crest crowning this amphitheatre of loose rock were alive with blue sheep and serow, which at our approach tried to escape and thereby brought down a murderous bombardment of sharp limestone rocks, but we escaped unharmed. From our camp we also made excursions to the highest pass to the east of Kwangke La to an elevation of 13,150 feet. Above the firs and spruces we met with crooked twisted junipers on the rocky slopes, while above were alpine meadows merging into loose scree. The flora at such heights could not but delight a plant lover. There were gorgeous satiny-blue poppies with large flowers arranged in spikes, asters, primulas, red and lilac poppies, yellow saxifrages, crucifers of various colours, forget-me-nots, and, above all, a very curious Saussurea resembling a drum-major's shako of woolly white; larkspurs, aconites, and gentians were represented by several species, while yellow-flowered Potentillas formed large cushions among the boulders. The scenery was grand and weird. Among these gorgeous flowers lived large snow chickens (*Tetraogallus tibetanus przewalskii*), but their protective colouring prevented us from bagging more than two.

From near the mouth of Tsalu Ku, Kadja valley narrows considerably, the slopes being densely forested, while the banks of the stream were a mass of lovely lavender- to purple-flowered rhododendrons, forming a narrow hedge. Beyond the hillsides had a most curious aspect. The grassy slopes were covered with a miniature forest of tall, unbranched erect Caragana (*Caragana jubata*), a leguminous plant with pink pea-like flowers; the plant had the habit of a columnar cactus. The small strips of meadows which we here and there encountered resembled brilliantly coloured carpets. We had now entered the domain of Tibet's golden poppy (*Meconopsis integrifolio*), one of the most gorgeous alpine flowers, and as we ascended the steep valley to the pass we met some Tebbu maidens who wore as girdles wreaths of golden poppies. At 12,000 feet firs and junipers formed groves and rhododendrons regular forests on the steep slopes. The babbling brook was silent in this region of frost, and near the pass the stream bed was a thick sheet of ice; huge icicles some 20 feet in length hung suspended from the cliffs, which here are black and fluted, full of holes and caves. Twenty-one months later I nearly lost my life here in a huge snowdrift into which my horse and I rolled from a precipice after having lost the trail.

Kwangke pass, 12,550 feet, is a swampy alpine meadow surrounded on its northern side by vast limestone crags and pinnacles, but sloping to the south into a short valley parallel to the backbone of the Min Shan. Huge massive limestone mountains rear their bare crowns some 15,000 feet into the sky,

Main chanting hall of the lamasery of Lassun Gomba in Drakana, upper Tebbu Land

The new lamasery at Wantsang, lower Tebbu Land

Looking east over the Tebbu villages of Drakana from the Pandrukika pass (11,300 feet)

while in a south-westerly direction extends an immense rock wall of fluted limestone, part of the rocky gate which leads into upper Tebbu Land. The tiny brook at our feet is one of the sources of a branch of the Kialing which joins the Yangtze at Chungking. To the west of the Kwangke pass the range is pierced by another pass which leads into a long valley called Chaba Ku, which debouches into the Tao river near a lamasery called Yaru Gomba, some 40 miles west of Choni. The people of this valley, especially those living in the lower part of it, are very hostile and are the sworn enemies of Prince Yang. It was at the village of Merishü in this valley that a Tebbu tried to bar my way with a drawn sword, but when I realized his intentions I galloped into him, and to save himself from being trampled under foot, he jumped aside.

The trail down Kwangke leads over a boggy slope to the beginning of the Peishui Kiang, a branch of the Kialing, over which I stepped. The brook is joined by a clear crystal spring, below which it enters a defile, with walls rising several thousand feet on both sides into the sky, while enormous talus slopes extend to the rhododendron-fringed stream-bed. Massive cumulus clouds towered over Tebbu Land, while black storm-clouds had gathered over Kwangke pass; but fortune favoured us, and the billowy clouds enhanced the grandeur of the scene. A vast sea of sharp ridges became visible, densely forested with firs and spruces, and overhung by mighty crags and pinnacles sharp as daggers' points. Here the Tebbu mountain-god Nike has his abode, for this hallowed ground is called Nike Tewa, or Nike's realm. He sits unwearied and unmoved in the shape of a lion turned to stone on the very crest of the eastern battlements, a sentinel looking north and guarding Tebbu Land. Here, at the foot of this mighty throne, devout lamas have erected an altar on which they burn as offering fresh juniper boughs, sending the fragrant smoke heavenward to appease Nike. Below Nike Tewa the walls of the cliffs are like the leaves of a standing book, a series of thin slabs of rock 1000 feet in height as if folded by a giant's hand. Between these rocky leaves red-barked birches clad in the velvet foliage of spring have found a foothold with dark-green spruces, while primulas abound on mossy boulders in the stream-bed. Clematis, iris, anemone, larkspur, and Tibetan lady slippers cover the verdant strips of meadow beneath Nike's throne.

The trail was clean and gravelly along the roaring waters of the stream. The air was filled with the fragrance of spring and the warblings of birds. As I gazed beyond I saw a sharp limestone spur covered with verdure bar our way; but the stream had cut its way through this obstacle as if the walls of the cliff had been butter. Here the Tebbus had built a trail above the torrent on logs placed horizontally in chiselled grooves in the walls of the defile. This is the key to Tebbu Land.

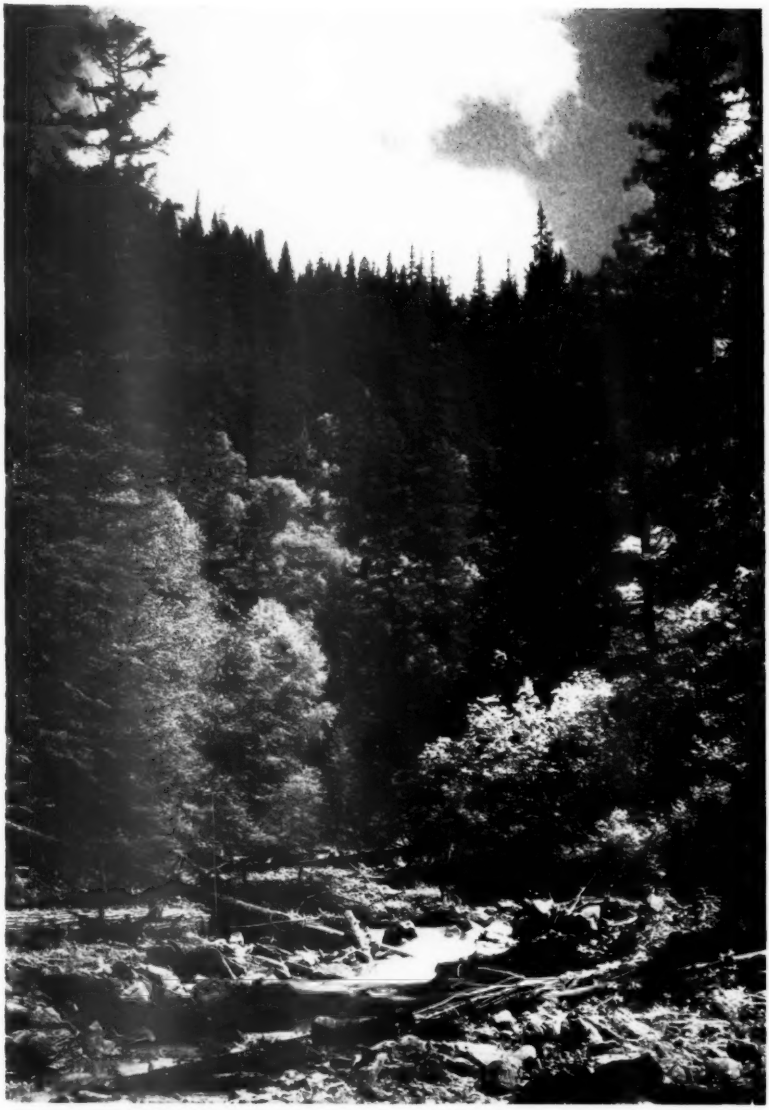
Every step revealed new beauty and new grandeur until we emerged from this narrow canyon into an amphitheatre surrounded by enormous limestone mountains crowned with crags and pinnacles. At their feet lay the Tebbu hamlet of Tongwa and above it, its very roofs touching the cliffs, the tiny lamasery of Lassun Gomba. Forests of sombre fir and spruce made a fitting frame. We had set foot in Dragumna in upper Tebbu Land. The Tibetan name for this amphitheatre has been well chosen, for Dragumna means stone box; the Choni people call it Drakana.

We crossed the stream and ascended to a large meadow terrace, and pitched our camp at 10,000 feet. A more glorious spot it would be difficult to find. A glance at the village of Tongwa showed me that the houses of the Drakana Tebbus were built nearly one on top of the other, three walls of one house serving as walls for three others. Drakana is indeed a mighty fortress built by nature, secure from invasion; for should an enemy come from the west in force he would find few outlets save the narrow rocky defiles of Yiwa Ku and Drakana streams. Our camp was soon visited by Tebbu men, while women, on their way to the forests behind our camp to gather humus for their yak pens, stopped near our camp to behold the marvels of it. Lamas from Lassun Gomba joined them, and by giving out little presents we quickly made friends.

With the greatest difficulty I took their photos, for although they were curious they were nevertheless wary and suspicious. They had not the slightest idea of what I was doing. The women kept on spinning flax, a wad of flax wound around a piece of wood which they had stuck down their back into their one and only garment. They wore sheepskin clothing, the wool next to the body, and from their hair down to the end of the skirt hung ornaments of the most ordinary kind, such as blue glass beads alternating with empty cartridges strung on yak-hair thread, yards of which they dragged behind them. The little girls had a tiny queue in front, and fastened to it were a few copper coins and one or two Kauri shells. They were delighted with silver and tinfoil paper, such as the Kodak people use to wrap films in. The girls almost fought about the paper, dividing it into tiny bits among themselves. I laid my watch on the grass while all the men and boys lay flat on their stomachs radiating from the watch like the spokes of a wheel, imitating the ticking of the watch and marvelling to see the hand go round. My thermometer they took for a pipe, but they were most interested in our guns. The Upper Tebbus, secluded and surrounded by natural fortresses, have kept from intermarrying with Kansu Chinese and represent one of the most primitive and pure tribes in this region. They are very unlike the nomads, who are a mixture of Tibetan and Mongol. The Tebbus are indeed aborigines in the truest sense of the word.

The tiny lamasery, a mere conglomeration of pigsties, houses one hundred and twenty akus or monks who lead a lazy life at the expense of the villagers of Drakana, of whom they are part. There are five villages in Drakana situated in the order named from east to west: Tongwa, Nieri, Tare, Tipa, and Taonto, the latter being the last hamlet in the Choni prince's territory, situated below Mount Banchu. This mountain peak is the actual border between Drakana and Szechwan, but beyond Mount Banchu is really no man's land. At the foot of Tongwa the Drakana stream is joined by a small stream from Mount Banchu, and continuing as the Yiwa stream enters a narrow rocky defile called Yiwa Ku.

Here I met a devout Tebbu pilgrim who had come from lower Tebbu Land on his way to the famous lamasery of Taerhsze or Kumbum on the Koko Nor border, far to the north near Hsining. Instead of going like an ordinary pilgrim, staff in hand, he had decided to measure the entire distance with his body, indeed quite an undertaking when one considers that it takes a regular caravan sixteen days, necessitating the crossing of high passes. He wore a leather apron over his single sheepskin garment, and on his hands he wore



Upper part of the Wantsang Ku, lower Tebbu Land (8700 feet), showing forest of "picea purpurea," maple, birch, and willow

An old Tebbu from Drakana, upper Tebbu Land

Tebbu boy from Drakana, with sword, amulet, and pronged rifle

wooden shoes, the soles being of wood 2 inches thick, the top of leather, into which he slipped his hands. Around his head he wore a leather strap with a small leather pad in the middle of his forehead. He prostrated himself completely, kneeling first and then sliding his wooden-shod hands on the ground, lying perfectly flat, both arms and lower limbs stretched out full length, while his forehead touched the ground. He then stepped forward where his hands had made a mark in the gravel and repeated the performance. At that rate it would take him many months to reach Kumbum. I gave him a piece of silver and motioned him to come nearer to where I stood in the sunlight to take his picture, but rather than walk the few feet and thereby break his vow, he measured the distance to me with his body, after which he continued his weary journey uphill through the rocky gorges.

Our first evening in Drakana was lovely. Clouds had gathered among the mighty crags which stood out like islands in an ocean; the birds were singing, not a breeze was stirring, quiet reigned in the sombre forest with its carpet of green moss. The air was laden with the fragrant odour of the spruces and balsam firs, which measured their heights against the towering cliffs behind.

Journey to lower Tebbu Land

Besides my personal entourage of Yünnan Na-hi I had with me quite a party composed of three lama officials, each of whom had to go to a monastery in lower Tebbu Land to sit on the lama throne and rule for three years, as many of the lamaseries in wild Tebbu Land are rather lawless and unruly. From Drakana we passed with a number of yak and a few donkeys down Yiwa Ku through another rock gate, a mere miniature in comparison to Drakana. Through this narrow valley, which one might better term a ravine, are scattered many Tebbu hamlets and quite a few lamaseries such as Bokho Gomba near the village of Godzuna. The people of this village are a bad lot indeed, and would not hesitate to kill any one for gain. It is the people of this region who go and hide in the mountains and on the passes to hold up innocent travellers, first killing their victims and then robbing them. It was here that my caravan was waylaid on our journey to Sungpan in March 1927. They jumped from behind the bushes and assaulted my muleteers, my men, and the Choni escort, with clubs crowned at their ends with a cogwheel-like metal cap. My escort opened fire, three Tebbus fell, while another Tebbu attacking my hunter received the contents of a riot shell from a number twelve repeating shotgun at close range in the lower extremities of his body. A fifth received a severe blow with an axe wielded by one of my muleteers sideways across his face. The only man of my party really injured was my cook; leaving their dead and wounded, the rest of the Tebbus fled into the forest, swearing vengeance.

Beyond the village of Gadza the limestone gives way to mica slate, shale, and schist. In the distance a high range is visible, beyond which lies Tara Ku, inhabited by the notorious Tara Tebbu. Here Tebbu Land consists really only of the valley of the Peishui Kiang, which to the confluence with the Tara stream flows in a narrow rocky gorge; the few hamlets being situated in lateral valleys or at their junctions with the main gorge, every bit of available land being terraced. The meadow called Djekuka, where the main arm of the

Peishui Kiang joins the branch coming from Drakana and Mount Kwang Ke, is the border between the lawless tribes of extreme north-western Szechwan and Choni territory, and always an exceedingly dangerous spot to pass. We waited therefore until our caravan and Tebbu escort had caught up with us, and thus with rifles ready for any fray we ventured cautiously on to the meadow. I looked carefully with my field-glasses, spying all the bushes on the other side for robbers. Quite a number were hiding in the bushes with rifles in their laps, but as they had found out that we had spied them, they unconcernedly came out and walked slowly up the river issuing from Tsaru Ku in no man's land. We were apparently too large a party for them. The stretch from Djekuka to the monastery of Pashetenga is called Drotsu Ku and is much broader than the gorge above Djekuka. Here are villages in plenty, but all are apparently at feud with each other, for as we arrived at Pashetenga, situated high above the river on a large grassy terrace, Tebbus had assembled and were exchanging rifle shots with their neighbours from Konre across the stream. Here spruces had given way to pine trees which formed lovely forests on the southern valley spurs, while the northern slopes were mostly loess and conglomerate and were covered with a xerophytic vegetation. Pashetenga is really composed of two monasteries called Nongama and Nongon respectively. As they represented merely a conglomeration of dirty huts I decided to pitch camp on the grassy terrace in spite of warfare.

On my last journey through Tebbu Land, *en route* to Sungpan, we were forced to stop in the lamasery, as we feared night attacks from the defeated Tebbus of Godzuna. The room I then stayed in was filled with nondescript villains, whose eyes spoke evil, and whose behaviour was worse than that of wild beasts. They were all potential robbers and murderers, and would stop short at nothing, for every one had killed his man. I wanted peace and quiet after an exciting day, but was forced to put up with this villainous-looking mob. Fortunately the people of Godzuna were at feud with the villains of Pashetenga, and so they did not follow us as they had threatened.

Below Pashetenga, on the northern banks of the Peishui Kiang, in the centre of the broad valley floor, I saw a large square of raised ground surrounded by what seemed to have been a moat; a similar plot exists a little farther south opposite the village of Rana. I learned that these plots were the ancient sites of the walled city of Tiehchow which came into being during the northern Chou Dynasty between 557 and 581 of our era. The city was abandoned during the Sui Dynasty but re-established during the reign of Emperor Tai Tsung of the Tang Dynasty about A.D. 627, who appointed Li Shi-tsi as Viceroy of Tiehchow; at least so read the annals of the Minchow provincial records. These ancient sites of a once famous city, ruled over by a viceroy as long as thirteen hundred years ago, should be of interest to archaeologists.

Here the valley of the Peishui Kiang is very fertile, the climate being considerably milder than at Drakana, which lies nearly 3000 feet higher; but we are still in upper Tebbu Land. The Peishui Kiang describes a large curve round the southern slopes of the Min Shan with its lateral buttresses and deep valleys debouching into the broad valley, carved by the swift currents of the river through the shale, schist, and loess of which this region is composed. Only here and there lateral limestone spurs extend across the valley. It is at

such places that the otherwise placid Peishui Kiang assumes the guise of a mountain torrent.

Villages and lamaseries abound, but the latter belong to the Black or Bon Sect, with the exception of the lamaseries of Pashetenga which are Yellow. We had now passed the most dangerous places in upper Tebbu Land, but there remained still the region of Tara Ku in lower Tebbu Land as well as the brigand-infested passes of Tsarekika in the eastern Min Shan. We had heard that the Tara people were on the warpath and that seventy had issued from their valley stronghold and had fought the people of Ngongon, a little hamlet in upper Tebbu Land, a number of Tebbus being killed on both sides. They are indeed a wild lot and certainly the equal of the Ngoloks. Their method is to make fierce attacks, rob and plunder, and then carry off the women, who must for ever remain with them as slaves. Unsuspecting travellers, if their people cannot ransom them, fare no better, and remain the slaves of the Tara Tebbus.

Several cantilever bridges span the beautiful river-bed lined with ancient poplars, usually opposite villages at the mouths of densely forested lateral valleys. On a terrace in a sweeping curve of the valley is the largest monastery of the Black Sect, Shi Shi Gomba, which I decided to visit, while my Yellow lama escort remained on the river bank, not being on good terms with the Bon Sorcerers. The place had recently been renovated, as the monks were busy stuffing prayer drums with miles and miles of paper closely printed with the prayer, not of Om Mani Padme Hum, but of Machi Shalando, the special prayer of the Black Sorcerers. The formula was more smeared than printed on the paper, and completely illegible, but apparently quite as efficacious when set in motion. Instead of turning the drums from right to left they turn them left to right, the Bon Lamas doing everything opposite to the Yellow Sect. One is bewildered by the various creeds, devil worship, and sorcery, but nowhere on the Tibetan border have I met with such primitive deities as confronted us at the Tebbu village of Gongo. They were of local manufacture and resembled totem poles. At the foot of a cantilever bridge over the Peishui Kiang which led to the village of Gongo, there stood in a pile of rock an immense scarecrow made of sticks and straw, with outstretched arms holding a spear. The previous year rinderpest had broken out among the yak of several Tebbu villages, and to prevent the spread of it the people of Gongo appointed this scarecrow as quarantine officer to scare off the disease. The posts at the farther end of the bridge were also carved, and facing the entrance to the village the Tebbus had erected several posts carved in the shape of supernatural beings, to ward off all evil which might enter by this bridge. These deities have no place in the lama church, and are apparently indigenous and peculiar to the Tebbu tribes. Beyond Gongo grew a magnificent species of juniper (*juniperus chinensis*), stately trees some 80 feet in height with lovely crowns. These trees were known to the people by the name of Tanhsiangmu, or sandalwood, owing to the delicious fragrance of the wood. In this fairy grove we pitched our tents.

At Peiju a great limestone buttress of the Min Shan, of immense thickness, extends into the valley, narrowing it to a wild defile through which the Peishui Kiang races into a deep canyon forested with pines and oaks. Here the trail,

which up to Peiju was fairly decent, became miserable and dangerous. A few planks stuck into the side of the cliff, supported by a few rotten sticks, carelessly placed on rocks in the stream bed below, formed a trail not wider than a foot, and this around sharp curves. Dirt placed on top of the shaky wooden trail had disappeared in places, leaving gaps and holes between the half-rotten planks which revealed the roaring waters of the torrent a couple of hundred feet below. The going was indeed exasperating, the trail zigzagging up a hillside of shale and debris reduced to a hand's width, the edges slanting into an abyss in which roared the imprisoned river. To pass with laden yak over such trails is nerve-racking. It took the caravan fifteen hours to reach Wantsang Gomba, 20 miles or so from Peiju.

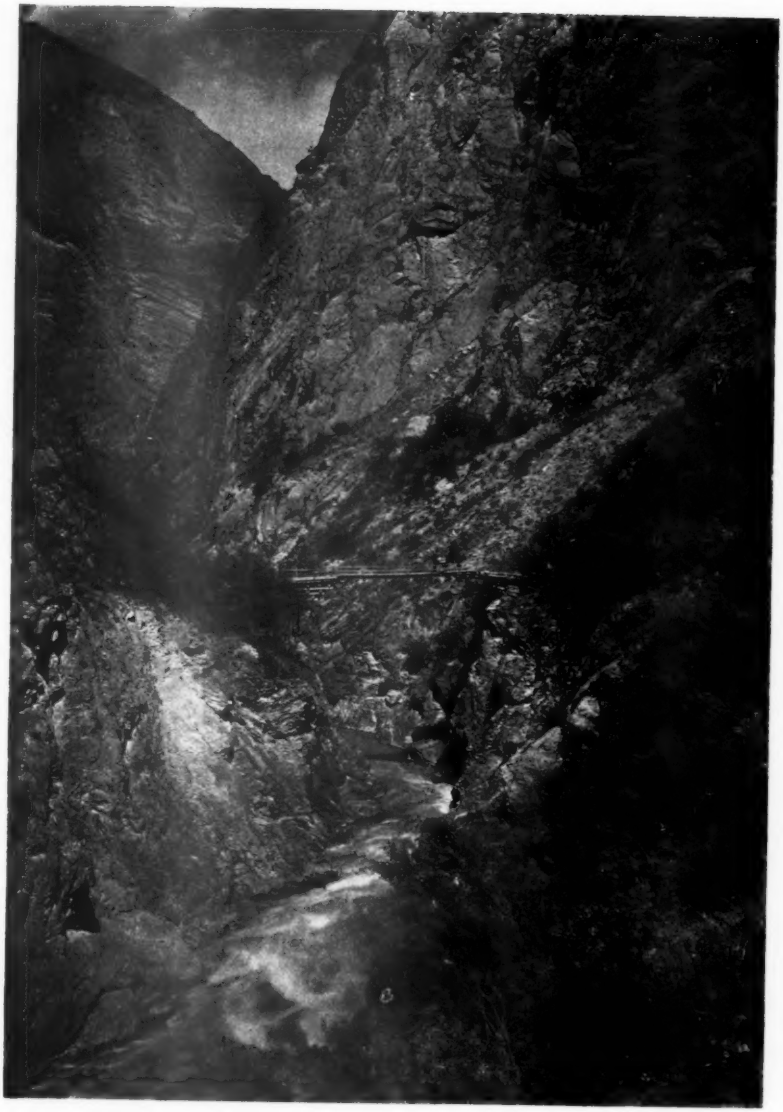
In this gorge we met a lonely Tebbu, and being always on the alert, for we were approaching Tara Ku, with its murderous Tara Tebbu who might be on the warpath, we asked him if the air was clear. He reported a large band of Tara warriors on a little meadow near the stream a short distance ahead. We held a council of war, and in order to ascertain who they were, the lamas of my party decided to go ahead to reconnoitre, while we all waited with the caravan in the forest. It was an anxious time. To our great relief we found that they were indeed Tara Tebbu, but in the act of arranging a truce with the Tebbu of Ngongon, hence they had given up fighting and robbing for the time being. The Tara Tebbu were dressed in brilliant red with red turbans, the fashionable headdress of the Lower Tebbu. They were sitting in two lots, their rifles stacked, but at our approach they rushed up the hillside to take a look at us. The lamas suggested that we should wait on the grassy bluff above until all our animals and loads had passed, for the Tara Tebbu, they said, could not be trusted.

Once through the gorge we passed the tiny hamlet of Nishika, the first village in lower Tebbu Land. The Peishui Kiang flows now in a deep narrow canyon which becomes more and more arid as we proceed downstream, until at a sharp turn it enters another arid limestone defile filled with enormous rocks, the river one mass of white foam and spray as it dashes from boulder to boulder. It is a dreary region indeed compared to the beauty of Drakana. It is like living in a prison: no outlook except the narrow strip of blue sky overhead, the rest sheer walls of rock covered with scrub. In this rocky canyon is situated the Yellow Sect lamasery, Wantsang Gomba, which was to be our headquarters for some time while we explored the gorges and canyons and especially the many lateral valleys filled with forest such as one would not dream to find in this otherwise arid region.

Lower Tebbu Land and Wantsang Lamasery

Practically the entire lower Tebbu country is under the jurisdiction of the lamas of Wantsang, and unless they give permission the people of the neighbouring villages will sell nothing to a stranger. We carried letters from the Choni prince written in Tibetan which instructed the lamas to procure for us all we needed: guides, mules or yak, victuals, etc.

Old Wantsang monastery, buried in this arid canyon, was indeed a forlorn and lonely place. I was shown to a house, the property of a Living Buddha, who was absent in Kumbum, in the Koko Nor. In all there were not more



Maya Chalon gorge: cantilever bridge across the Peishui Kiang

Entrance to the limestone gorge of Yovutang

than thirty lazy monks who twiddled away their time by chanting prayers, trimming butter lamps, and filling copper bowls with water for the gods. My house was like a chamber of horrors, for on the shelves in the corridor outside my room were arranged devilish masks with protruding red tongues 2 feet long; three-edged daggers; skull drums and other religious paraphernalia were tied to door-posts; while the moth-eaten dried heads of old Tibetan grizzly bears, showing their tusks, graced the centre of the hall: an abode worthy of the demons whose effigies lurked in every corner of the house. Still the lamasery is a quiet retreat. The entrance serves as a shelter for sheep and goats, as the accumulated manure testified; while our donkeys found shelter under the large prayer drums on both sides of the gate. A few old apple trees grew in the courtyard near the ancient chanting halls. Quiet reigned; it might have been the city of the dead.

The sky was black and a strong wind rushed madly through the hot canyon. The few poplar trees in front of the monastery were shaken fiercely by the gusts of the oncoming storm; the thunder rolled and echoed in the deep canyon. The narrow lanes in the monastery and the square in front of the chanting hall were forsaken. In the vestibule, with its wheel of life and a picture of the Tibetan mystic mountain in the centre of the Earth around which the sun revolves, sat two lonely roosters perched on a bar, like the lamas here without female companions. The place smelled of rancid butter, and other vile odours permeated the atmosphere, but neither gods nor lamas cared. An old liogryph incense burner, taller than a man, spat fire, the wind causing the lion to roar as it fanned the fire within its bowels. Above it all one could hear the thunder of the imprisoned river in the canyon and the jingling of the temple bells fastened to the eaves of the roofs.

And yet this monastery had seen much strife and bloodshed. Three years ago the lamas of Wantsang monastery settled a feud of long standing. It culminated in a fray in which Tibetan swords were freely used. Five lamas were butchered, while twelve of the opposing force were driven into a house which the furious lamas set on fire, cremating alive the twelve of their fraternity, while their Living Buddha fled to Labrang. Such is the brotherly love these wild monks practise instead of following the Law and the Middle Way. The ruins of the building still bear witness to the cruel deed. After the lamas of Wantsang had agreed to separate, one half left to start a separate monastery now known as the new Wantsang Gomba. Thus came into being a new lamasery 12 miles south of the old one on the north bank of the river. The monks of the Tebbu monasteries are recruited from the wild Tebbus themselves, who apparently do not benefit by becoming monks, and instead of following Buddha's teaching, have only donned dirty red rags, which apparently make a lama in this part of the world.

From Wantsang Gomba we explored the rich valley of Wantsang (Ku), Tsaoshi Ku, and others, the richest and longest being Wantsang valley, filled with virgin forests of deciduous as well as evergreen types, such as spruces, firs, junipers, rhododendrons, maples, etc. The valleys to the south are richer than those of the northern slopes, which are more or less of a xerophytic character. They rise steeply from the river beds, while those debouching from the south are usually several days' journey long, and rise gradually.

A short distance beyond Tsaoshi Ku a long lateral valley debouching into the Peishui Kiang canyon, the geological formation of which has been mainly slate, shale, and schist, changes near Niba Ku, a rocky ravine from the north, again to limestone, caused by a long lateral spur extending from the Min Shan. Through this massive buttress, about 4 miles broad, the Peishui river has cut for itself an extremely narrow gorge. This defile is called Maya Chalon by the Tebbus and is spanned by two swaying cantilever bridges. The trail through the Maya Chalon is execrable and extremely dangerous. As far as the first bridge the trail descends in short steep zigzags to the foot of a reddish-grey limestone cliff, and is merely composed of tiny planks stuck into the rock wall and resting on a doubtfully secure scaffolding. In places the boards rest loosely on the posts without being fastened to the cliff, leaving a rift for 20 to 30 yards. One holds one's breath crossing this shaky ribbon of a trail, with an abyss on each side, and the waters of the Peishui Kiang roaring deafeningly and madly over 100 feet below. Only one person or animal can cross at a time. Beyond the second bridge the trail is even worse: huge chutes and chasms in the limestone wall are bridged over with a zigzag trail suspended in the air, freely swaying, its only support being posts resting on the rocks below, without lateral support. To lead a horse across such a shaky contraption needs steady nerves.

Beyond Maya Chalon the country is more open, but a deep gorge, called Maya Ku, leads northward, not to the Min Shan proper, but to a parallel limestone range south of the Min Shan and connected with it. East of the mouth of Maya Ku is situated the hamlet of Maya, and around a bend of the Peishui river surrounded by scrub-covered hills the rebel lamas had built their new Wantsang monastery. The whole mountain mass to the north is one maze of intricate gorges, valleys, spurs, and passes. It is this part of lower Tebbu Land which rivals in beauty Drakana. The forests are immense and undisturbed since time began. The trail leads up Nyiba Ku, and crossing the spur which divides it from Maya valley, ascends that gorge to a pass called Lamugungun. From this grassy pass 11,250 feet high the trail descends into fir, birch, and rhododendron forest, the ground being carpeted with light green moss, while wild cherries and long-leaved willows form the undergrowth. The trail is muddy, the descent steep, and with the many projecting roots and tangled rhododendron branches very tiring, yet too beautiful for words to describe. We descend steeply into Laniba Ku, a long valley which merges into Samba Ku, a valley crowned by huge crenelated battlements of limestone known as Gaguma or the small Guma. The forests are dense and composed mainly in the upper part of red or rather purple spruces (*Picea purpurea*), and in the lower reaches of a mixed type of forest, but with the spruce still predominating. Samba Ku in truth is divided by a narrow forested spur into two parallel valleys whose streams unite below the Tebbu hamlet of Hera. There are besides Hera two other villages situated in this great amphitheatre, Wukho and Bensa, both on the northern banks of the Samba Ku below the mighty crags.

Taguma, the highest eminence of the Min Shan, about 17,000 feet, controls the valley of Samba Ku, rising straight from the forests of the valley floor. Pure limestone, bare and rough, it forms the western wall of a great

Looking up the Min Kiang between Shawan and Tiehki, north of Mowchow

Tsarekika (11,250 feet), the eastern pass over the Min Shan, above the cloud-filled Chatseti valley

rock gate or Shi Men called Yovudraku, which permits ingress to the main pass and mountain top of the Min Shan, here called Tsarekika. The latter is however not reached until one has negotiated many winding chasms. The sombre forests where eternal twilight dwells merge into lovely alpine meadows, here called Yovutang, rich in flowers. One is soon however engulfed in forest which extends to the very walls of the overtowering cliffs. The trail enters the giant gateway Yovudraku, meandering along the stream-bed through narrow stretches of larch, fir, and birch. The ascent is steep, the trail climbing the valley walls and clinging to the very cliffs. Up and up we climb; the stream-bed is piled high with enormous limestone boulders the size of a small house, one piled upon the other, the waters roaring invisibly beneath. The scenery is so wild that it becomes terrifying, and one casts anxious glances up the walls thousands of feet in height, especially when one comes to places where the trail is smashed and littered with huge blocks of rock which hinder progress. One stops and listens as a huge avalanche of rock, dislodged by wandering serow or blue sheep, descends a narrow crevice in the wall; at first it sounds like distant thunder, when with a crash it strikes the trees, tearing their barks to shreds. The trail hugs the very base of the 3000–4000-foot high overhanging cliffs carved by time and the elements into coxcomb-like spikes, themselves hundreds of feet high.

In the centre of the rock gate a huge pyramidal mountain mass divides the canyon, guarding the two clear streams which here flow at almost a perfect level. The bed is broad and glaring white, but bordered by rich forest of fir, spruce, birch, and maple. Although the stream-bed is at an elevation of 10,000 feet the walls rise straight for thousands of feet more into the sky. To the north-east debouches the canyon called Doyaya, up which the trail leads to the second pass called Yencherungo, and the actual divide between the Yellow River and the Yangtze. To the left of Doyaya is seen the weird canyon of Dollo, so narrow and filled with debris that it is difficult to penetrate, and yet it is the passage way of Tebbu brigands who have their stronghold higher up on a small meadow. It is indeed a most inaccessible region which one can visit only with the approval of the Choni prince, for without proper guides and escorts it would be impossible to reach this place.

The Lower Tebbu seem to be a peaceable people, and very different in character from the Upper Tebbu, whose language also differs. It is the latter who make this region unsafe. They lurk among the crags of the high passes, and after murdering and robbing their victims, even their own lamas should they chance to pass, flee across the border into Szechwan territory, which they know is no man's land and a refuge for the outlaw. In the upper end of Doyaya the rock changes; instead of the limestone crags, carved into pinnacles and turrets, we find massive walls of a fine reddish-grey conglomerate, at first superimposed on limestone, with here and there a slab of overhanging smooth rock having the appearance of thick dough squeezed out of the crevices. These walls of conglomerate have rounded tops and stand like skyscrapers, but are more susceptible to erosion and disintegration than the hard old limestone. There is no end of rock gates as one passes from one canyon to the other.

At Yencherungo, which is a large meadow at the head of Doya[illegible] canyon, surrounded by crags of limestone forming a huge amphitheatre, w[illegible]aited for

our caravan, for this whole region is infested by Tebbu brigands. The trail ascends over the alpine pass into another gorge filled with forests and thence into a lateral valley called Chatseti, where we camped at the very foot of the trail which leads to the final pass and summit of the eastern Min Shan, Tsarekika. Opposite our camp, on the top of the high valley wall, were peculiar red chimney-like rock columns which my Tebbus called Tsareshima and of which they were very afraid; they told me in whispers that these rocks embodied an evil spirit, which devours human beings. From Chatseti the trail ascends steeply in zigzags over the grassy slopes. Heavy clouds hovered over our valley and hid the huge cliffs which shut in Chatseti. My Tebbu escort yelled; some ahead, some behind, they called to each other for encouragement or to let lurking robbers know that we were many. I myself emptied my revolver as an additional warning to waiting brigands. It was on this pass that one of my party was once shot and wounded by Tebbu outlaws. It is the happy hunting ground of the Upper Tebbu robbers.

Somewhat below the pass we were enveloped by fog and mist. The trail led to the foot of the conglomerate crags, which stood up like giant exclamation marks; we could barely make them out, while above the blue sky could be seen through the mist. The crags themselves were luminous from the rays of the morning sun, though still shrouded in vaporous mist. One of our Tebbu boys left the regular trail and ascended directly among the crags between which he disappeared. The summit was lined with double rows of conglomerate pillars between which the trail led to the pass. There the Tebbus loaded their rifles, and with ours ready for any emergency we ascended to the top. We all gave a sigh of relief when we found that the air was clear. At our feet lay Chatseti covered as with a white blanket, out of which rose a stupendous bluff and pinnacles of red conglomerate illumined by the morning sun. Through the mist, on the edge of the alpine meadow on which we stood, we could see the rocky gates through which we had just cautiously made our way with anxious hearts, and nerves keyed to a high pitch, for it is not pleasant to find oneself engaged in a pitched battle with wild Tebbu brigands, such as we had encountered at this very place over a year ago.

From Tsarekika the trail leads into a narrow rocky chasm, so narrow that the saddle frames had to be removed from our mules to let them pass, and each box had to be carried sideways through the defiles. We finally emerged by the headwaters of the Hsiao Ku stream, which in its upper reaches is hemmed in entirely by conglomerate cliffs. The region in its lower course is composed of limestone with the ever-present rock gates or Shi Men. From Adjuan to Choni is a distance of 30 miles mainly down the valley of Tayü Ku, less interesting than Kadja Ku in the western Min Shan. Instead of following Tayü Ku to its junction with the Tao river, a spur is crossed into a smaller valley called Poyü Ku, whence it is 10 li to Choni. In spite of the hostility of the Tebbus and their murderous attacks, I shall always look back on our exploration of Tebbu Land as one of the greatest pleasures and joys of my life. It is to the kindness of the Choni prince and his courteous assistance that the exploration of Tebbu Land became an accomplished fact. There still remains much to be done, for the territory is vast indeed, and it is impossible to visit every gorge and crag. The only region botanically unexplored in Tebbu

Land, but traversed by us in its entirety, is the extreme south-eastern end, from the mouths of Toro Ku and Asha Ku to the summit of the Dakhe La or Yangpu Shan, 12,300 feet, the extreme south-eastern border of Choni and Szechwan. Toro Ku is a canyon best approached by following Tsaoshi Ku to its end where, on a spur or saddle, is the Tebbu hamlet of Pakar. The Toro Ku stream has its source on the north-western slopes of the Dakhe La, a few miles below which is situated, at an elevation of 9500 feet, the last hamlet in lower Tebbu Land: it is called Tayü gongmar by the Tebbus, and Yangpu in the Choni language. This region we traversed with the greatest difficulties in March 1927, owing to deep snow.

At the last gateway out of Tebbu Land, which we had literally to force open by cutting a path through snowdrifts, the Tebbu mountain spirits demanded from us their due sacrifice in the shape of three mules who succumbed under their loads in the deep snow on Mount Dakhe. Here we said farewell to Choni and the Land of the Tebbus.

Note on the river names

In Chinese as well as in Tibetan territory streams are usually known by several names, which are applied to certain stretches of their course, instead of one name throughout the entire length. The largest stream traversing Tebbu Land is known in Choni as the Peishui Kiang or White Water river. This stream has its source in the grasslands of Szechwan near a lamasery called Datso Lhamo. The stream is there called Tsaru, as it flows in a valley called Tsaru Ku. Another, but shorter, branch of it comes from below Kwang Ke, a pass on the southern slopes of the Min Shan, and flows through Drakana in upper Tebbu Land into a gorge called Yiwa Ku; it is therefore known as the Yiwa stream. The confluence of the Yiwa and the Tsaru is called Djekuka, and from thence to Pashetenga the stream is known as Drotsu. From Pashetenga it becomes the Donjralechu, and in lower Tebbu Land the Chulungapu. Beyond Shui-pi, the last hamlet in the east in Tebbu Land, it becomes the Peilung Kiang or White Dragon river, until it reaches the Chinese town of Hsiku. From there to Kaichow, or Wutu, it becomes the Hsiku Ho, and below Wutu the Wutu or Kaichow Ho, and near Pikow in the extreme south of Kansu it is called the Heshui Ho or Black Water river. In northern Szechwan the river loses its identity as it joins the Kialing, one of the larger rivers of Szechwan, entering the Yangtze at Chungking. There the river is navigable by steamers as far as Hochow, a distance of 90 li from Chungking.

Note on the map.—The sketch-map has been compiled from an extensive series of route-traverses by the author, which he has very kindly deposited with the Society, with much similar material relating to other journeys. These traverses show many new names and much detail, and add much to our knowledge of very badly mapped regions. They have however no astronomical or trig. control. A few such known positions have been utilized in placing an approximate graticule. We were unable to undertake the long task of compiling and adjusting the traverses accurately on a larger scale, and it is doubtful if material is yet available. When it becomes available, and time permits, we may hope to produce a much better map. Meanwhile the originals will be preserved by the Society if the author permits.—Ed. *G.J.*

REMARKS ON THE PREHISTORIC GEOGRAPHY AND UNDERGROUND WATERS OF KHARGA OASIS

H. J. L. BEADNELL

CONCENTRATED research, confined to a relatively restricted region during two successive winter seasons, by such keen and competent students of archaeology and geology as Miss Caton-Thompson and Miss Gardner, has yielded an invaluable mass of data from which it is possible to form, with at least some measure of assurance, general conceptions of the physiographical and climatic conditions and changes during the different stages of the human occupation of the Oasis of Kharga and adjoining high plateaux, and of the period immediately preceding. Details of the work accomplished and of the deductions drawn therefrom by these authors have been published in various scientific journals, the most comprehensive account being that in the *Geographical Journal* for November 1932.[1] As the researches already carried out are to be extended this winter into southern Kharga, I venture to make a few remarks and offer one or two criticisms regarding the conclusions so far published, in the hope that they will be thought to be of sufficient interest to be taken into consideration before Miss Caton-Thompson and Miss Gardner bring their work in the oasis to a termination. My remarks are, I admit, based on a study of the geology and water-supply of the district made twenty-five years ago, and I can make no pretensions to special archaeological knowledge.

Tufa Deposits.—Knowledge of the travertines of the region has been very greatly extended. The "Plateau" type, in which, except for reed-impressions, neither leaves, shells, nor human tools have been found, is considered by Miss Caton-Thompson and Miss Gardner as undoubtedly the oldest—an assumption apparently based largely, if not entirely, on physiographical features—the "Wadi" or lake tufas being recognized by their associated implements as having been formed at three different periods of the Palaeolithic. These latter tufas contain land and freshwater gastropods as well as leaves and reeds, and presumably it was from them that Zittel collected specimens of *Quercus ilex* and *Arundo* nearly sixty years ago. It is now suggested that the Plateau type of tufa is of the same age as the travertine and associated beds which were laid down in the Nile Valley and now occupy large areas in the bounding cliffs of the valley in Upper Egypt. These latter, mapped by the Geological Survey long ago but never adequately described, have recently been re-examined by Dr. K. S. Sandford,[2] who regards them as having been laid down in a Pliocene gulf of the Mediterranean, a conclusion differing little from that generally held twenty-five years previously. Sandford's finding is, it should be noted, based entirely on the relations of these deposits to the later Pleistocene gravels containing Mousterian and pre-Mousterian flint implements, and apparently is

[1] "Some Problems of the Pleistocene Hydrography of Kharga Oasis, Egypt," *Geological Magazine*, September 1932; "The Prehistoric Geography of Kharga Oasis," *Geogr. J.*, November 1932.

[2] "The Pliocene and Pleistocene Deposits of Wadi Qena and of the Nile Valley between Luxor and Assiut (Qau)," *Quart. Journ. Geol. Soc.*, vol. lxxxv, pt. 4, December 1929.

unsupported by a single fossil, vegetable or animal, marine or freshwater—a strange case, considering the vast extent and great thickness of the presumed Pliocene strata.

Although Miss Gardner and Miss Caton-Thompson mention the presence of freshwater shells in the Nile Valley deposits of the Abydos district I do not find any record of the specific forms met with, or of the age indicated by these fossils; and neither they nor Dr. Sandford appear to have come across the beautifully preserved leaves also to be obtained in the same district, which it would be highly profitable to compare with the leaf-remains of the Kharga tufas. Unfortunately the original collection of leaf-impressions made by me many years ago is not available, the specimens sent for examination and determination to Europe having mysteriously disappeared. One cannot help wondering whether the lake or Wadi tufas with leaf-remains in Kharga and the Nile Valley are not of contemporaneous origin; though in view of the dating of the former by associated human artefacts, such a surmise, if correct, would necessitate a revision of the age suggested by Sandford for the latter.

Reasons are given for the separation, in point of age, of the Plateau and the earliest of the Wadi tufas in Kharga, but these do not seem to me altogether convincing. Absence in the former of both leaves of trees and worked flints may well be accounted for by position and different mode of formation. The highest and most exposed part of the steep escarpment would not have been an ideal situation for human occupation or for the growth of trees. And if, as seems probable, the Plateau type of tufa was deposited mainly by springs, oozing from the uppermost part of the cliffs and fed by slowly percolating rain-water from the adjoining tableland, leaves of trees—assuming the latter were able to flourish on the plateau itself—would not easily have been carried into and preserved in the deposits.[1]

The sporadic distribution of the travertines and their restriction to a comparatively limited portion of the Kharga escarpments is well worthy of the further attention it is proposed to give to these peculiarities. Incidentally, one would like more detailed information on the stalactitic deposit pictured in Plate 13, which is said to show a jungle of tree trunks.[2]

Deposits on Floor of Depression.—Widespread deposits of finely bedded mixtures of sand and clay, with residual wind-eroded stream-line hummocks, form one of the most striking features of the depression. Curiously enough neither Zittel nor any of the earlier geologists who visited the oasis made any mention of these deposits; nor do I find them referred to by my old colleague Dr. Ball. They were first noted by me in 1906, and described[3] in 1909 as lacustrine deposits formed of sediments carried by streams, or of wind-borne sand and clay-dust from the surrounding plains. Further consideration however, and more especially dynastic requirements expounded to me by Professor

[1] The evidence available to date obviously indicates a somewhat greater age for the Plateau tufa. My remarks on this tufa, admittedly purely negative as evidence, were made in the hope that they might be taken into consideration before the work in the oasis was concluded, and are, I think, justified by Miss Caton-Thompson's reference to the corroborative evidence which Miss Gardner is seeking this season. (I have added this and a few other footnotes after reading Miss Caton-Thompson's reply to my remarks.)

[2] *Op. cit.*, *Geogr. J.*, p. 392.

[3] 'An Egyptian Oasis' (John Murray), 1909.

Breasted, led me to abandon the idea of one or more long-continued open and extensive sheets of water, and to regard the deposits as wind-borne material carried on to and held by marshy areas and tracts covered with vegetation—a method of accumulation I have shown to have been very effective in raising the level of the floor of the depression both in historic and modern times.

The very searching examination which Miss Gardner and her colleague have had the opportunity of carrying out has enabled them to subdivide these accumulations into (1) Loess-like, (2) Pleistocene Spring Overflow, and (3) Historic Well, deposits, and to give the original, already moribund, idea of a prehistoric lake surviving into historic times its quietus. "The abundance in them [the Historic Well Deposits] of freshwater shells and animal bones, combined with the failure to distinguish between the different origin and ages of the three superficially rather similar deposits, was the primary cause of the old lacustrine fallacy"; and "the occurrence in them of sherds of red pottery and segments of clay water-pipes provided a further source of error, for to accommodate these objects it was necessary to postulate a lake existing on into historic times."[1] These are rather severe reflections on my rapid pioneer work, and I must take what comfort I can in the recollection that I had at least the good fortune to be the first to bring the existence of these very important deposits to public notice, and that the time which my duties, as manager of a desert reclamation company, enabled me to spend on their examination was infinitesimal as compared with that available to my successors. But the last word has by no means been said on the correct subdivision, age, and methods of accumulation of these beds, and further advances and alterations of existing ideas may confidently be expected in the future.

Prehistoric Springs.—This removal of the lake from the prehistoric map appears to have caused my successors considerable temporary embarrassment on the score of prehistoric man's water-supply, though the lake as a necessity to man, or as an amenity of the district, had not occurred to me when I suggested its existence.

The conditions which obtained in the oases before the Persians initiated their great well-sinking campaign make interesting speculation, rendered more difficult still by the fact that the original characteristics of all natural sources must long since have been obliterated through the efforts of man to improve and keep up his water-supplies. Prehistory has been called a "strange compound of archaeology and geology," but for a satisfactory understanding and elucidation of prehistoric water-supply a third ingredient must be added, hydrology.

Springs and seepages from both the surface water and the true Artesian Water Sandstones must, it has always seemed to me, have existed at favourable points on the floor of the depression ever since the oasis attained, in prehuman times, its existing general configuration and depth. That such natural springs provided prehistoric man with one of his sources of water appears now to have been demonstrated by the energetic action of Miss Gardner and Miss Caton-Thompson in opening up a number of extinct water-sources located by them in the Kharran district. The flint implements found on the surface and in the excavations of these sites indicate that one or other of these particular springs

[1] *Op. cit.*, *Geogr. J.*, p. 382.

functioned and was occupied by man during Late Lower, Middle, and Upper Palaeolithic times, and it is concluded that the group of springs as a whole became defunct and deserted during the Neolithic period. As the Middle and Lower Palaeolithic are generally considered to represent a space of time amounting to some fifty or sixty thousand years, the persistence of these springs can only be described as remarkable, if one considers the comparatively short lives of deep bores sunk to the true artesian sandstones in Persian and Roman times, and also during the last seventy years.

While offering my hearty congratulations on the very important discoveries, I must add that I am conscious of some hesitation in accepting the view that the bizarre accumulations, exposed in the excavations of these ancient water-sources, are adequately accounted for as natural deposits laid down during times of great activity of the springs. They are described as "violently disturbed, slipped and faulted," as "clays and sands flung up chaotically from the Cretaceous series below"—so strange, in fact, that "geology, never before confronted with anything similar, was nonplussed to explain their origin."[1] If, without having seen the deposits exposed in these excavations, I may venture an opinion, I would suggest that they were formed, at least in good part, in exactly the same way as those surrounding nearly all Kharga water-sources in exposed situations, of whatever age, *i.e.* are the results of the conflicting efforts of man to keep open vital water-supplies and of Nature to destroy them.

As it is, in my opinion, underrating the intelligence of early man to doubt his capacity of sinking comparatively shallow pits to obtain water-supplies from the Surface Water Sandstone, I cannot agree with Miss Gardner and Miss Caton-Thompson that the "only alternative" to springs would have been the deep-seated Artesian Water Sandstone—admittedly inaccessible in Palaeolithic times. And although these authors, on the evidence obtained by them, have come to the conclusion, contrary to the views held by some authorities, that in Kharga there were no "pluvial periods" except in a strictly limited sense—the area remaining throughout prehistoric times an arid region varying from full desert to poor steppe[2]—they themselves do indicate the existence of moist periods at intervals in the Palaeolithic. During these, and for long subsequent periods, it appears to me that the level of saturation of all porous strata near the surface would have been far higher than at present, thus rendering the exploitation of supplies from the Surface Water Sandstone even easier than at the present day.

The same authors favour the Surface Water Sandstone[3] as being the source of these so-called fossil springs of the Kharran district. They suggest increased volume and pressure (artesian conditions in fact) in that sandstone during

[1] *Op. cit.*, *Geogr. J.*, p. 384.

[2] *Geogr. J.*, p. 402.

[3] Contrary to the statement made in the *Geographical Journal* (p. 378), it may be remarked that the individuality of the Upper or Surface Water Sandstone was not recognized by the Geological Survey when the oasis was surveyed by Dr. Ball in 1898. Its identification, and the recognition of its marked distinction as a water-carrier from the true artesian water beds, only became possible during the extensive boring operations conducted by the Corporation of Western Egypt, of which I was in charge for three years from the autumn of 1905.

Palaeolithic times, owing to the "established fact that the equatorial regions in the Ice Age received more rain than they do at present and that there were several pluvial periods, possibly corresponding to the advances of the ice in Europe."[1] It seems to me difficult to reconcile these marked pluvial periods in the south with the supposed absence of similar pluvial periods in the region under discussion. But as it is admitted that these suggestions are purely tentative I will do no more than point out that the Surface Water Sandstone is a local development of the stratigraphy, not so far recognized outside northern Kharga; so that it is unsafe to assume that this particular member of the Cretaceous series ever could have benefited by increased rainfall in the Sudan.

Continuous fissures being ruled out as an extremely unlikely possibility, one also has, in estimating the possible effects of increased rainfall in an intake region hundreds of miles distant, to consider the maximum possible rate of flow of water through the pores of a sandstone. That such additional rainfall, saturating the beds to a higher level, would augment the static head in the sandstones farther down the dip-slope, where they had passed under impermeable clays as in Kharga, is probable; but it is at least doubtful if it would effect marked variation in output at different periods in springs remaining at the same level. The rate of flow through arenaceous beds is strictly limited, being governed by such factors as size of pores, actual porosity or water-holding capacity (much greater in fine than in coarse-grained sandstone), temperature, pressure, and the presence or absence of fissures.

It seems moreover straining the extent of actual knowledge to take for granted that it has been "established practically without doubt that the saturation of the Artesian Water Sandstones of this part of the Libyan Desert occurs in their outcrop area in northern equatorial regions in the direction of the Chad basin."[2] I doubt if either of the authorities quoted in support of this, more especially Ball, who has the advantage of being an engineer as well as a geologist, meant to do more than indicate a very possible collecting ground for part of the water which finds its way to, and becomes artesian in, the southern oases.[3] My own experience, when recently sinking wells for the Egyptian Government in the desert far to the south of the oases, has made me realize how little is known of the geology and hydrology of the country intervening between them and those regions of the Sudan which have more than a spasmodic rainfall.

The origin of the artesian waters of the oases is in fact still a matter on which little definite can be said. Possible sources, as I pointed out in 1909,[4] lie in the rainy districts of the Sudan, in the great swamps of the Upper Nile, in the mountainous region of Abyssinia, in the Nile river itself, and in past accumulations of water absorbed in previous more rainy periods. But we do know definitely that the Nile for a considerable course flows through a valley cut out

[1] *Op. cit.*, *Geol. Mag.*, p. 418.

[2] *Op. cit.*, *Geogr. J.*, p. 378.

[3] I am grateful to Miss Caton-Thompson for calling my attention to the statement in 'Problems of the Libyan Desert,' and as I have no means of knowing whether Dr. Ball has modified his views as a result of the data obtained through the sinking of Bir el Messaha—an important test of his main theme—I must dissociate him from, and take sole responsibility for, the views I have expressed regarding the origin of the artesian waters of the southern oases.

[4] 'An Egyptian Oasis,' pp. 159, 160.

in the Nubian Sandstone and loses a very appreciable volume of water into that sandstone. Mr. J. L. Craig, of the Egyptian Survey, estimated that at low Nile 6000 cubic metres (1,320,000 gallons) per minute drain back into the river from the beds on either side between Khartum and Wadi Halfa, which suggests, if it does not prove, enormous percolation into the sandstones from the river when in flood. And these sandstones are continuous and identical with the artesian-water strata underlying the oases of Dakhla and Kharga.

Kharga Oasis between Neolithic and Persian Times.—That the first great development of the oases, by the sinking of deep wells and the excavation of extensive underground aqueducts, was carried out by the Persians is, I believe, universally accepted. Conditions in the oases, as regards population and water-supplies, during the preceding five thousand years, is a matter on which different opinions are held.

Miss Caton-Thompson and Miss Gardner reject the view of close relationship between the oases and the Nile Valley in dynastic times and conclude that Kharga at the close of the Neolithic became practically uninhabitable for lack of water, and was deserted except for Libyan badawin during the fifty centuries previous to the Persian conquerors of the XXVIIth Dynasty. This finding, so far as based on physiographic study and the failure in Neolithic times of one particular group of springs, appears to me open to considerable doubt; and the supposed hiatus in the history of man in Kharga hardly seems in accordance with the evidence of well-known hieroglyphic records. Egypt, after the death of Rameses II, was overrun with Libyans, some of them penetrating to the southern oases; but these people, as Breasted remarks,[1] far from being totally uncivilized barbarians, were skilled in war, well armed, and capable of serious enterprises. The presence in the oases of these pushful Libyans, who came to Egypt, as Merenptah bewails, "to seek the necessities of their mouths," does not seem to tally with or support the idea that Kharga was almost uninhabitable for lack of water.[2]

The absence of important Egyptian monumental remains in undeveloped outlying territory does not seem surprising, and such records as do exist, dating from the XIIth, XVIIIth, XXIst, and XXIInd dynasties, cannot lightly be brushed aside as "scanty hieroglyphic allusions." These refer definitely to intercourse between the Egyptians and the inhabitants of the oases; to the annexation of the entire oasis-region by Thutmose III; to the oases as places

[1] 'History of Egypt,' pp. 466–467.

[2] To me the main and burning question remains the presumed uninhabitability of the region *owing to lack of water* during the long period between the close of the Neolithic and the coming of the Persians. Miss Caton-Thompson seems to relegate this question, as of slight importance, to the background, and almost confines her attention to the, to me, far less important and interesting question as to whether or no the inhabitants were people of Egyptian culture—a point on which I was careful to state I was not competent to form an opinion, apart from the meaning the known hieroglyphic allusions conveyed to my mind. My recapitulation of the available literary evidence, after refreshing my memory by a perusal of the relevant portions of 'A History of Egypt,' and 'Ancient Records of Egypt,' admittedly added nothing to what was already known, but it did enable me to emphasize the existence of a water-supply derived from flowing springs, and the practice of irrigation and agriculture long before the advent of the Persians; and to suggest that the reference to wells and cisterns indicated a water-supply derived from natural sources and retained in artificial reservoirs.

of banishment; and to the appointment of a Libyan governor in the Great Oasis by Sheshonk I, the Shishak of the Bible. The Dakhla stela, found by Sir Henry Lyons in 1894 at Mut, with an inscription in hieratic dating from the reign of the last-mentioned Pharaoh, describes a lawsuit lasting fourteen years over the ownership of a flowing spring, refers to irrigation and agriculture, wells and cisterns. This old document suggests a water-supply derived from natural springs retained in artificial reservoirs, and indicates agricultural inhabitants rather than roving Arabs.

Towards the end of their admirable and suggestive paper Miss Caton-Thompson and Miss Gardner appear to weaken somewhat on their earlier attitude regarding the uninhabitability of Kharga owing to lack of water in dynastic times, as they refer to the Dakhla stela and allow the fact that wells existed in that oasis, if not in Kharga, a considerable time previous to the Persian domination. Conditions during the earliest period of the Egyptian calendar and throughout the Ancient Empire can only be a matter of surmise, the first mention of the oases being some two thousand years B.C., when the Pharaoh of the time was in communication with their towns. To what extent the inhabitants at different times were people of Egyptian culture is a question on which I am not competent to offer an opinion, but a thousand years before the advent of the Persians it was recorded on stone that Thutmose was in possession of the entire oasis-region, and that this region remained an appanage of the lords of Thinis and became famous for fine wines.

MR. BEADNELL'S REMARKS ON THE PREHISTORIC GEOGRAPHY AND UNDERGROUND WATERS OF KHARGA OASIS: COMMENTS AND REPLIES

G. CATON-THOMPSON

Miss Gardner's absence in Kharga since November throws responsibility for commenting on some of Mr. Beadnell's remarks on to me, and therefore I think it fair to dissociate her from anything here said on specifically geological points. I have no fear she would dissent from my comments, for our views on all the major points are unanimous; but she might wish me to amplify, or handle them differently. I can however speak confidently for her, as well as for myself, when I thank Mr. Beadnell for the care with which he has read our papers, and assure him of our respect for his pioneer work, which we acquired first in the Faiyum, and which has been deepened by our renewed opportunities to scrutinize it in Kharga.

The following points in his paper seem to call for some reply:

Tufa Deposits.—Failing the opportunity in 1930 to examine the Nile Valley tufas in the detail needed, we provisionally accepted, as the best evidence available for purposes of reference, Dr. Sandford's published conclusions of their Pliocene age. Suspicions that those we noted in the Abydos region might be Pleistocene were however aroused. Their closer investigation was therefore in the forefront of this winter's programme, and Miss Gardner spent some days last November at the task. Her results will be published only when sufficiently matured. In the meanwhile I may say that our and Mr. Beadnell's surmises of a Pleistocene age for some, if not all, are fully confirmed. A correlation with

the archaeologically dated series of Kharga tufas is therefore now in sight; and the hitherto vague surmises with regard to the Pliocene date of the tufas in this region will now, as Mr. Beadnell hopes, be superseded, in part at any rate, by concrete evidence for the Pleistocene date of some of them.

I fear it is optimistic to hope to compare the leaves of the Kharga with those of the Nile Valley tufas; so far we have found no palaeo-botanist able to identify a single one of the seven different kinds we collected. Doubt has even been expressed as to the validity of Zittel's determinations. Until this has been done their cross-dating value is of course nil, and their evidence for climate very slender.

We have not yet been able to use the tufa-shells collected near Abydos for correlation with those listed from Kharga by Miss Gardner (*Geol. Mag.*, September 1932, p. 395). Her wisdom in deliberately withholding the names of the Nile Valley shells is justified; for premature correlations with Kharga types might be misleading until the tufa-fauna of the Nile Valley has been collected on a scale comparable with the care and time devoted to the Kharga collections. The more interesting types are rare, and exhaustive collecting is needed to secure them. The rapid collection of Nile Valley tufa-shells *en passant* in 1930, however valuable in view of its novelty, is unlikely to be a true index of the full assemblage.

Plateau Tufa.—Our reasons for announcing the greater age of the so-far undated "Plateau" type were based partly on physiographical, partly on stratigraphical considerations, and the purely negative evidence advanced in support of the suggestion for their contemporaneity with the earliest "Wadi" tufa—namely, reasons for the *absence* of leaves, for the *absence* of tools, and the *absence* of human attraction (a pure supposition)—weighs very lightly compared with the positive evidence of its physical distribution in relation to the Palaeolithic tufas. I would refer to our *Geographical Journal* paper, Fig. 3, stages 1 and 4, and, in view of the relative position of the two earliest tufas, ask how they could be contemporary? The isolation of the Plateau tufa from the scarp by great longitudinal valleys of the primary drainage system is really impressive. But equally conclusive of greater age is the fact that derived fragments of the Plateau tufa are present in the boulder-beds underlying the earliest Wadi tufas (*Geol. Mag.*, *op. cit.*, pp. 401–402). In any case, a preliminary report on this season's scrutiny of the Nile Valley tufa-series encourages me to hope that Miss Gardner has secured corroborative evidence of value.

Title of Plate 13.—The photograph shows a group of pseudomorphs, or more exactly, casts of stems *in situ*. Internal cavities in cross-section have been noted up to 20 cm. in diameter, a size justifying, it seemed to me, who was solely responsible for the description, the word "trunk."

Deposits on Floor of Depression.—I can assure Mr. Beadnell that in publishing our fresh evidence on the floor deposits we never dreamt that he could feel that it cast "rather severe reflections on his rapid pioneer work." In the *Geol. Mag.*, pp. 386–387, we say: "All workers in the Libyan Desert owe a debt of gratitude to those two great pioneers (viz. Dr. Ball and Mr. Beadnell) who have done so much towards a fundamental understanding of desert geology and hydrography. If the author's work does not always bear out some of their

conclusions, this is a natural result of detailed investigation of a period which necessarily received little study in rapid, preliminary surveys, without which more specialized later work would have been impossible." I beg him to accept that sentence as representing our feelings past and present.

Mr. Beadnell himself, as we were careful to point out (*Geogr. J.*, p. 380), modified his earlier opinion as to the existence of a lake or lakes; but in maintaining that his older view was already moribund when it received from us its quietus, he under-estimates, I fear, the longevity his too-excellent account gave it at birth. Apart from the belief in a lake expressed to me in conversation by various Egyptologists, who doubtless remembered Mr. Beadnell's book, 'An Egyptian Oasis,' let me instance an authoritative example, published as recently as last year. In 'Le Sahara,' by C. E. P. Brooks (Societé de Géographie, Paris, p. 76), I find the sentences:

> "L'histoire de l'oasis de Kharga . . . a été racontée par H. J. L. Beadnell. . . . Dans les temps préhistorique l'endroit était habité, mais il n'y avait pas lac. Vers 500 av. J. C. l'oasis fut à nouveau occupée et très prospère. Les plus vieilles constructions et monuments sont limités au bord de la dépression, ce qui indique qu'a cette date le lac s'élevait encore a un niveau de 200 pieds. La diminution progressive du lac est marquée par l'extension des constructions vers des points de plus en plus bas. . . . Quand le pays devint province romaine, le lac était devenu un petit marais."

The reason for this unfortunate tendency of the lake hypothesis to retain its prestige is not surprising. Mr. Beadnell's book of 1909, 'An Egyptian Oasis,' was deservedly widely read and has never been superseded. He devoted a whole chapter headed "The Extinct Lakes of the Oasis" to a detailed and highly interesting account of them. Although I had heard indirectly that his views had changed, I had great trouble to find the publication where he restated them. All I was able eventually to trace was contained in the final paragraph of a letter in *Geogr. J.*, January 1911 (a reference given in *Geogr. J.*, p. 380, footnote) in reply to certain criticisms made by Ellsworth Huntington on the lacustrine theory. I am, even now, in ignorance if Mr. Beadnell has published more fully elsewhere, and of where the evidence which caused him to change his opinion may be found. In view of these facts it seemed reasonable to state our own conclusions based on new data unknown to Mr. Beadnell quite plainly and give, if possible, the "lacustrine fallacy" the quietus, since he had not, in fact, done so himself.

Prehistoric Springs.—Mr. Beadnell's remarks on the hydrography, backed by his specialist knowledge, are of great interest and value. Particularly important to our work is his warning that the Surface Water Sandstone is possibly no more than a local development; though Miss Gardner was aware of this we are indebted to him for pointing it out, and indeed for all the constructive criticism contained in his remarks under this heading.

In regard to the source of artesian water I regret if I have strained the extent of actual knowledge, or attributed to Dr. Ball a view with which he would not fully concur. We based ourselves upon Dr. Ball's paper, "Problems of the Libyan Desert," *Geogr. J.*, July–September 1927. Re-reading the 4th section of that paper, "The Artesian Water Supplies," I find Dr. Ball has expressed

himself with his usual clearness, and we may perhaps be pardoned for having taken such unambiguous language at its face value. He reviews the conflicting theories held up till 1925 in regard to the possible sources of the artesian water, and then proceeds to describe his own work based on the recently extended knowledge of levels, and he ends: "The conclusion seemed irresistible that all the wells considered[1] were fed from a continuous sheet of underground water; and it was evident that this water did not come from the Nile, firstly, because of the high level of Merga which is above that of the swamps of the Bahr el Ghazal, and other western feeders of the White Nile; and secondly, because of the direction of the downward slope of the underground static water-surface, which is from the south-west, instead of from the south, as it would have been had the water been derived from the Nile in the Bahr el Ghazal region. The true source of the water must be somewhere more or less nearly on a line drawn south-west from Dakhla, for this is the direction of upward slope of the underground static water-surface; and if such a line be drawn on a map of Africa, it will be found to lead towards the Erdi and Ennedi region, on the borders of the Chad basin. It is in the highlands of Eastern Erdi and Ennedi, therefore, that we must look for the source of the artesian water of the Egyptian oases." We were under the impression that Mr. Beadnell's view of Nile contribution to the artesian supplies of the Western Desert, expressed in 'An Egyptian Oasis' in 1909 and elsewhere, before the Libyan Desert had been carefully levelled at a number of points, had been superseded in favour of a south-westerly origin.

In regard to the fossil-spring deposits themselves and the great length of time during which the springs were active—namely, the Lower, Middle, and early Upper Palaeolithic periods: I do not, for my part, suppose that any single member of the spring-groups was active throughout that period, but it is impossible to ignore the concrete proof of cultural evidence *in situ* that that was, indeed, *collectively* the case.

We carefully considered the possibility of their artificial exploitation by Lower Palaeolithic man and his successors. It was a glorious possibility, the substantiation of which would, incidentally, have brought us enviable renown in prehistoric archaeology. It was not substantiated however, but abandoned before the end of the first season as irreconcilable with the observed facts. Our continued work on them the second season confirmed the wisdom of its rejection.[2]

The deposits are extremely complicated, and any one who has not had the advantage of having examined them personally must inevitably fail to take into account complex data which the investigators had to bear in mind when forming their conclusions. We had the advantage also of searching discussions with the Director of the Geological Survey of Egypt, whose visits while the 30-foot sections of the Aterian spring deposits stood open were the occasion for re-examination of the evidence. The only certain cases of recognizable prehistoric artificial exploitation of the spring water (on a very small scale be it noted) are the Neolithic instances to which we refer, *Geogr. J.*, p. 387.

[1]Sheb, Merga, Kufra, Abu Mungar, Dakhla, Kharga.

[2]Miss Gardner writes (Jan. 2): "I *certainly* cannot agree with Mr. Beadnell about the artificial origin of the springs; it seems to me out of the question."

Kharga Oasis between Neolithic and Persian Times.—It is a misapprehension, I think, to believe that the Persians are "universally accepted" as the authors of the deep wells and aqueducts in the oases. Some authorities support an earlier dynastic origin, whilst others believe them to be native Libyan work possibly of Garamantian connections. The whole question is, I believe, still actually in its infancy: and in advancing my own present opinion of Persian origin, based on field observation, I took pains to set forth the available conflicting evidence so that the reader could strike a balance of opinion for himself. Mr. Beadnell, in his continued and very reasonable reliance on the literary evidence, only recapitulates, mostly quotation for quotation, the evidence I gave detrimental to my own opinion (*Geogr. J.*, p. 373). The Dakhla stela is, on the face of it, such important evidence against my view, that it is referred to early in the paper (p. 373) and again on p. 405. I do not think that it is quite justifiable to say that "at the end of our paper we appear to weaken somewhat on our earlier attitude regarding the uninhabitability of Kharga in dynastic times." My actual phrases are:

p. 374 "No habitation on a level higher than scattered semi-nomadic badawin would be possible."

p. 403 "Oasis practically uninhabitable for lack of water, the haunt of Libyan badawins watering around small seepage pools from the Surface Water Sandstone. Their traces identified in a small settlement of Pan-grave type possibly dating 1700–1600 B.C."

p. 405 "Suggesting that Kharga was, in fact, practically uninhabited in dynastic times."

These sentences seem to me, re-reading them, quite consistent, and depict what our evidence combined in the two papers seemed to suggest—namely, that the water-supply in the pre-artesian period was very limited and uncertain, and insufficient to encourage Egyptian settlement; that it was fit only in quality and quantity to support Libyans whose permanent numbers were probably very restricted indeed. The question of my consistency however is of slight importance. What *is* important is whether my interpretation of the field-observation that Kharga was destitute of people of Egyptian culture throughout dynastic times, and the reason for it, is justified or not. Mr. Beadnell thinks, for excellent reasons—namely, literary allusions which I quoted—that it is not. So, I am sure, do many other people. But, as I value his opinion probably more than he realizes, I should like to be sure that he has fully understood the force of the evidence upon which my view was founded, which conflicts strangely with the literary allusions and which should not be ignored. His remark on p. 133 that the "absence of important Egyptian monumental remains in undeveloped outlying territory does not seem surprising," suggests that he has not seized my point. The absence of Egyptian monuments means nothing —no archaeologist would assume for a moment it did. But what *is* significant is the apparently complete absence of those ubiquitous and informative minor objects—sherds of the potteries of dynastic Egypt. They are indestructible; their fragments are inevitable; their total absence, if Kharga was indeed a thriving place of towns and vineyards, is inexplicable. And when their absence on the floor of the depression was supported by an equal absence from

the passes in the Eastern scarp, themselves littered with classical and later pottery as Mr. Beadnell knows, the fact is much too extraordinary not to be taken very seriously into account, in weighing the extent of Egyptian connections with Kharga Oasis. If pre-Persian Egyptian remains turn up in Kharga I shall of course immediately and publicly retract this view, with relief at the reconciliation of literary with field archaeology. In the meanwhile I hold to my belief, reiterating our last sentence in the *Geogr. J.* article: "The answer to these questions may be given by further field-work."

We have received the following note from Mr. E. J. Wayland:

Perusal of the interesting and valuable paper by Miss G. Caton-Thompson and Miss E. W. Gardner, in the *Geographical Journal* for November last, encourages me to communicate some results of my recent work in Uganda and Tanganyika Territory which may be of interest to those concerned with past climates, particularly as there is a quite remarkable agreement between these and some conclusions reached by the authors mentioned.

The story is a long one and I do not propose to tell it now, but briefly the main issues, so far as past climates are concerned, are these: As a result of a visit to the now notorious Oldoway Gorge, under the guidance of Dr. Leakey, I came to some conclusions at variance with those of the East African Archaeological Expedition. To my mind there is no escape from the conclusion that the first pluvial period came to a close with the accumulation of what the expedition calls Bed III, a deposit containing tools of Late Chellean or Chelleo-Acheulean facies. Then followed a dry period, and subsequently the second pluvial ushered in the Acheulean culture. I have found a similar sequence of events and cultures in Uganda. Moreover, just as there were two rainfall peaks in the second pluvial, as I pointed out years ago, so it appears there were two in the first pluvial, which, it seems, began in the Pliocene and lasted till Middle Pleistocene times.

Pluvial I was of much longer duration and was much more severe than Pluvial II, and it was in the latter part of the former—perhaps in the last quarter of it—that the oscillation referred to took place. Stone Age cultures have been found in association with all the deposits, even in early Pluvial I beds; and the relative ages of earth-movements of great geomorphic significance occurring during the pluvials have been determined. They are found to have been contemporaneous in Uganda, Kenya, and Tanganyika.

Nsongizi, Kagera river, Uganda. 14 *December* 1932.

THE SKOOKUMCHUCK BASIN OF THE PURCELL RANGE

GILBERT WILSON

THE recent articles by Thorington and Cromwell on the watershed of the Purcell Range[1] bring the basin of the Skookumchuck Creek into prominence, as it embraces the relatively unknown area between Findlay Creek on the north and Mark Creek on the south. The important features of the former valley have been described in the second article; the latter and the country farther south have been mapped both topographically and geologically.[2] The Skookumchuck basin was explored in 1924 by a prospecting party working for the Consolidated Mining and Smelting Co., Ltd., of Canada. The party, consisting of Messrs. J. Davis and G. Holland of Kimberley, J. Warren of Penticton, and myself, traversed the area during the months of June, July, and August of that year, working from the Sullivan Mine at Kimberley. Supplies were brought from the latter town by pack-horses to rendezvous points at prearranged times.

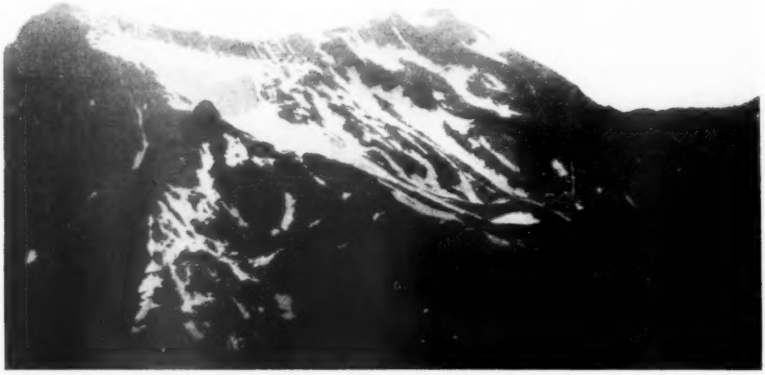
Leaving Kimberley by the trail up Mark Creek, we spent the first night in a fire-ranger's cabin at the foot of the steep pass leading into the headwaters of Buhl Creek. We crossed this pass next day and pitched camp near the junction of Buhl Creek and a small tributary flowing from a pass leading to the headwaters of Cherry Creek. From this camp we explored the Buhl Creek valley, the upper Cherry Creek basin, and part of the Mark Creek watershed. The latter ridge afforded some good scrambling, and we had to avoid one or two awkward snow cornices. We then descended Buhl Creek and followed the South Fork upstream. The going was very bad, and it often became necessary to cut out the trail through thick undergrowth. An unsatisfactory camp was made at a point near the stream, and the party divided: Davis and Holland worked south, up a valley closed in by a magnificent amphitheatre of peaks; Warren and I continued westwards towards the St. Mary river watershed. Camp was established on a grassy patch between the forest and the foot of the screes below Mount Sawtooth.

Directly opposite this camp rose the white granite cliffs of Mount Skookumchuck, a fine double-peaked mountain, probably the highest in this area. By crossing the valley and climbing on to the watershed south-west of the mountain, we obtained a direct and easy route leading to the lower of the two peaks. A descent down broken slabs brought us to a gap, from the easterly end of which an open scoop led to the final summit. We followed the same route for the descent. The view obtained from the top was magnificent: to the east, beyond the foothills of the Purcells and the Rocky Mountain Trench, rose the Rockies themselves; to the south, the grey-green cliffs of Mount Sawtooth stood out before a background of jagged peaks that formed the head of Mark Creek; and westwards across a sea of unknown mountains stood the strangely shaped Fry Pinnacles.

[1] J. M. Thorington and E. Cromwell: (i) "The Purcell Source of the Columbia River," *Geogr. J.*, vol. 77, p. 455; and (ii) "The Purcell Source of the Kootenay River," *Geogr. J.*, vol. 79, p. 32.

[2] J. S. Schofield, "The Geology of the Cranbrook Map Area," *Geol. Surv. of Canada*, Memoir No. 76 (1915).

View down the main Skookumchuck valley, showing the dissected peneplain



Eastern face of Mount Sawtooth

Looking south from Mount Skookumchuck to Mount Sawtooth and the Mark Creek watershed

The First North Fork

Below the Mark Creek watershed

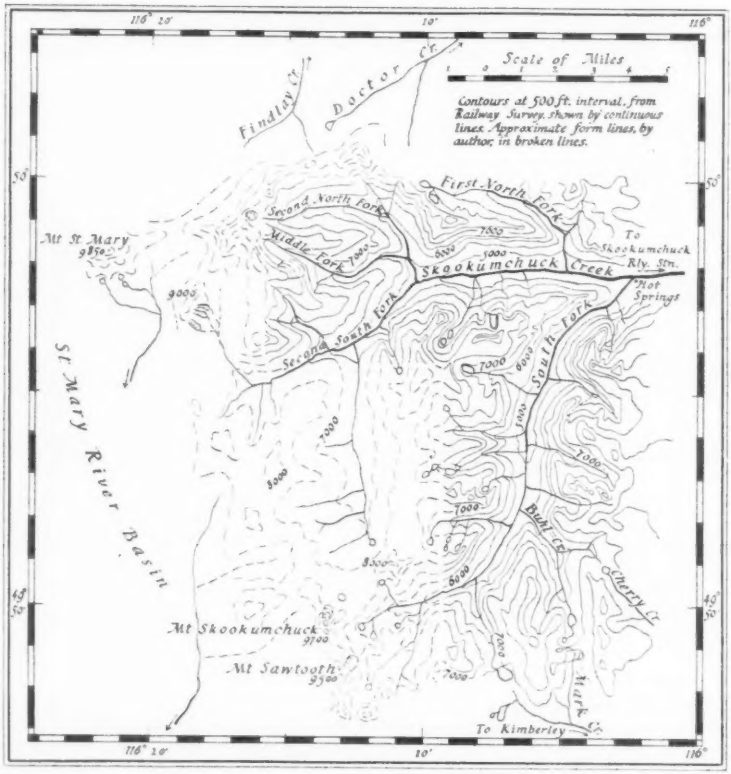
Mount Skookumchuck from Mount Sawtooth

Next day we ascended the north peak of Mount Sawtooth. The climbing was never very difficult, though the quartzite rock was loose and treacherous. Except for Mount Skookumchuck, little could be seen, since the air was thick with the smoke of forest fires. Shortly after this ascent, we returned to meet Davis and Holland at the last camp. From here we traversed Peak 8000, lying north-west of the camp. North of this mountain lies an unmapped, timber-covered valley draining northwards into the second South Fork of the Skookumchuck.

The next camp of importance was at the junction of the South Fork and the main stream of the Skookumchuck. This point, which made an excellent camp site, was rendered doubly attractive by the presence of hot springs. One of these fed into a roughly built log and stone tank in which comfortable hot baths were to be had. First-class trout fishing was obtained about a mile downstream, below a series of waterfalls, up which the fish had been unable to make their way. This natural barrier accounted for their absence in the main Skookumchuck basin. In 1924 a trapper who had constructed a cabin near the hot springs was trying to stock the river above the fall by transporting in a bucket fish caught below the falls and placing them in the creek, at the junction of the South Fork and the main stream. Two miles west of the hot springs the first North Fork enters the Skookumchuck. An old trail used to follow the valley of this creek, over the watershed into the headwaters of Doctor Creek, a tributary of Findlay Creek. Old blazes marked the original line of this trail, but fresh undergrowth and fallen timber had blocked it completely.

Four miles farther west the main stream divides into three branches: the second North Fork, the Middle Fork, and the second South Fork. By establishing a camp at the junction of the second South Fork and the main stream it was possible to explore most of the area drained by the two more northerly creeks. Thick timber gave way to more open country above 6000 feet on the second North Fork, but both the Middle and the second South Forks flowed down densely wooded valleys. The head of the Middle Fork valley was however easily accessible from its northerly neighbour by a narrow pass near the head of the valley. This pass was approached, from the north, by a well-graded zigzag track leading up the talus slopes from below; it appeared improbable that this path could have been made by human agency, and Davis considered it to be a goat track. An encounter with a herd of seven of these animals in single file, ascending from the Middle Fork valley, at the top of the pass itself, lent considerable weight to his suggestion. From the head of the second North Fork we attained the watershed between the St. Mary River, Findlay Creek, and the Skookumchuck. The ascent involved a little climbing and the cutting of a few steps with a geological hammer in the small mountain glacier guarding the head of the valley. From this viewpoint we observed the true relationship between the main Purcell watershed and the Skookumchuck basin, and realized the mistake in the existing maps (Thorington and Cromwell (ii), p. 36). The descent was made by working north and east along the Skookumchuck—Findlay Creek divide, here broad and easy going. To the left, steep but accessible slopes dropped down to the forests and meadows of Findlay Creek, beyond which rose the peaks and snowfields of the main Purcell water-

shed. To the south the eye travelled over the whole Skookumchuck basin to the Mark Creek divide; and from this point on the northerly edge of the area, Mount Skookumchuck appeared as one of, if not the highest of, the peaks south of the Findlay Creek mountains. We regained the valley by descending from the ridge by a series of grass and rock ledges which afforded easy scrambling; they would have been awkward for a man carrying a heavy pack, and impossible for horses. At no point on the upper Skookumchuck—Findlay Creek divide did we observe a pass suitable for pack-horses. We spent one night on the



Sketch-map of the Skookumchuck Basin

edge of the tree-line at the head of the Middle Fork, whence we returned down the valley to the camp by the main stream. The descent was exceedingly slow and laborious; any trail that might have previously existed was completely blocked by thick brush and fallen trees. Locally, snow or rock slides had formed long narrow areas entirely covered by fallen timber, all pointing downhill, and most awkward to cross, many of the tree trunks being ready to continue sliding at the slightest touch.

We then moved camp some 2½ miles up the second South Fork. Thence,

when supplies were almost expended, Davis and Holland worked up towards the more northerly source of the stream and succeeded, after an arduous trip, in crossing the divide into the St. Mary river basin. The route they followed is uncertain, but it was understood that they traversed the watershed in the vicinity of the three glaciers near Point 9000. In the meanwhile I descended the main valley to Skookumchuck station by a relatively good trail.

Maps

The official maps of the region are of little use in this area. But the greater part of the Skookumchuck basin, excluding the peaks on the watersheds, has been carefully mapped on a scale of 2 inches to the mile, for purposes of a timber survey. This work was done by the Canadian Pacific Railway many years ago, but was not published. The accompanying map includes this earlier survey, a copy of which was kindly sent to me by Mr. S. G. Porter, Manager of the Department of Natural Resources, Canadian Pacific Railway Company, Calgary, Alberta. The topography of the country lying beyond the limits of the C.P.R. map has been sketched in by myself but cannot be considered accurate.

Geology

A detailed study has already been made by Schofield (*op. cit.*) of the geology of the region south of the Mark Creek watershed, and the Skookumchuck basin shows a northerly continuation of the pre-Cambrian Beltian quartzites found in that region. The Aldridge formation, which crops out in the Mark Creek valley, grades into the Creston formation in the Cherry Creek basin and about halfway down Buhl Creek. The Creston quartzites are in turn overlain by the more argillaceous Kitchener formation, the contact occurring to the north of the Cherry Creek Lake. Intruding into these ancient sediments is a relatively small batholith of porphyritic granite. The southerly boundary of this intrusive mass can be traced, from the south of Mount Skookumchuck, northeastwards parallel to the South Fork. It crosses the latter south of the hot springs. The northerly margin follows the general trend of the second South Fork, including part of the Middle Fork, and much of the ground drained by the first North Fork. The north-easterly continuation of this intrusion lies beyond the area explored. Diorite dykes, probably early phases of the batholithic intrusion, occur south of the granite. Locally, contact metamorphism has altered the massive quartzites to reddish micaceous schists. The ground lying to the north of the granite mass, that is the upper Middle Fork, the second North Fork, and most of the Skookumchuck—Findlay Creek divide, is composed of quartzite that weathers a reddish-brown colour, resembling the Aldridge formation in general appearance. Locally, the elevated peneplain, from which these mountains were carved, is well preserved. Broad and flat-topped ridges, now undergoing dissection, are common features, and are well shown on either side of the main Skookumchuck valley. Many of the ridges show smooth sloping flanks to the south and south-west; glacial cirques and hanging valleys are developed towards the east and north. Most of the streams draining these cirques flow from small tarns of great beauty set amidst magnificent surroundings.

Fauna

The Skookumchuck basin contains many animals characteristic of the region. Both grizzly and black bears were observed on rare occasions. Caribou and deer tracks abounded in the meadows of the second North Fork. Goat were often encountered, either in pairs or small herds numbering up to seven; sheep however were absent, though they are believed to occur in Findlay Creek. Porcupine were common throughout the area and, together with a type of partridge, were occasionally eaten. The latter were so unused to humans that they could be knocked from the trees by stones, and one sat still while we fired three shots at it from a 0·45 revolver. Trapping for marten was carried on during the winter months. As previously mentioned, trout swarm in the main stream below the waterfalls near the hot springs. On account of the warmth of the ground hereabouts, the fish are reported to spawn much earlier in the upper part of the stream than they do in the colder water near its junction with the Kootenay river. We found the area to be delightfully free of those insect pests that so often render the Canadian bush a place of torment; mosquitoes were only found at all troublesome near the foot of Mount Sawtooth, and a few deer flies made their appearance near the hot springs. A small brown wood-tick, which occurred on the leaves of the under-brush, was at times very irritating. These insects bore into the skin, and if not removed *in toto* form a most unpleasant sore. On two or three occasions small rocky eminences were found covered by thousands of ladybird beetles. No snakes were observed by any member of the party. The absence of rattlesnakes, so common in the western United States and in many parts of southern British Columbia, was often commented upon.

Trails and Approaches

Access to the area can be made from Kimberley on the south, or Skookumchuck station on the east. The trail from the latter was well cleared and good as far as the junction of the mainstream and the second South Fork; the trail from the hot springs up the first South Fork was cleaned out in 1924, but has probably fallen into disuse. From Kimberley, up Mark Creek and down Buhl Creek, the trail was found to be steep but passable to pack-horses; the continuation up the South Fork became rapidly worse and worse; near the head of the valley all vestiges of earlier travel are absent and we traversed virgin forest. Here the going was very bad indeed: broken or uprooted trees lay in every direction, often forming obstructions 15 feet high, and progress was best made by walking along the fallen trunks; sometimes we would cover hundreds of yards in this manner without taking a step on the ground.

With the exception of Mount Skookumchuck, names employed in this article have been taken from local usage; they are however subject to the approval of the Geographical Board of Canada.

NAMES ON THE ANTARCTIC CONTINENT

FRANK DEBENHAM

THE exceedingly difficult problem of suitable names for stretches of coast on the Antarctic continent is brought to the fore once again in an able article by Professor W. H. Hobbs, in the *Geographical Review* for October 1932. It is written in vindication of the discoveries of the United States Exploring Expedition under Lieutenant Charles Wilkes, in 1840, and there can be no doubt that the name of Wilkes should be associated with a much greater extent of coast than in some recent maps of the Antarctic. The work of Mawson along that sector of the Antarctic has been the chief factor in this vindication of the essential truth of the claim of Wilkes that he outlined a continental coast.

We must not forget however that it was the fault of Wilkes himself rather than any ill-nature on the part of his critics that caused justice to him to be so long withheld. Professor Hobbs is perhaps unduly severe on those explorers and geographers who have been cautious in accepting Wilkes's discoveries, since for seventy years after his voyage no confirmation of them had been made, but, on the other hand, several of his eastern landfalls had been sailed over. Indeed, up to 1911, the only confirmation for his discoveries was the prior landfalls of Balleny in 1839 and D'Urville in 1840, at Sabrina Land and Adélie Land respectively.

A most admirable map, published with the article, is itself the clearest indication that justice is due to Wilkes for the central part of his discoveries, but it also affords ample reason for the remarks of those other explorers who had sailed over the eastern part of his Land. It is Ross who comes in for the heaviest criticism for his attitude to Wilkes's claims. Wilkes had, with great generosity, sent him a tracing of his discoveries from a "preliminary chart" of his cruise, and Ross, a few weeks later, sailed across a section of the land on that tracing. To those who know something about the choleric temper of Ross it is perhaps unnecessary to add that his remarks exceeded the limits of courtesy. We can regret that Ross was not more polite about it, but can hardly blame him for a measure of incredulity. It does not alter the case that in the later "official chart" that particular patch of land was removed, though it does show that Wilkes himself had entered it on his original chart with less certainty than other of his discoveries. Again, when in 1904 Scott sailed across "high mountainous lands" with peaks specifically named by Wilkes, it was but human nature to write as he did: "the mountainous lands reported by Wilkes . . . to the west, may be equally unsubstantial." Captain Scott follows up that remark by explaining quite politely the non-existence of Wilkes's eastern landfalls: "Only those who have been to these regions can realise how constantly a false appearance of land is produced, and no position could be more favourable to such an illusion than that in which his expedition was placed when it skirted the edge of a thick pack containing innumerable icebergs." He does not cross off the whole of Wilkes's discoveries, but says with reference to the places he had just sailed over, "I must conclude that as these places are non-existent there is no case for any land eastward of Adélie Land." In 1915

Captain Stenhouse in the *Aurora* also passed close to the position of "Cape Hudson," and indeed imagined for a day that he saw it "looming up through the mists in the form of a high bold headland," but the next day, when it was clear and fine, he says, "Not a vestige of land can be seen, so Cape Hudson is really Cape Fly-away."

These gentlemen therefore did little more than was warranted by the facts in suggesting that since some of Wilkes's discoveries were unsubstantiated, the others must be treated with caution until confirmed. It was exceedingly unfortunate for Wilkes's reputation that the first section of his discoveries to be tested was precisely that where they were the least trustworthy, but we must at least be guarded in blaming the incredulous for not believing that the central section of this cruise was of a different order of accuracy altogether.

It becomes a matter of interest therefore to inquire how it was that Wilkes's landfalls at the beginning and the end of his cruise have proved to be false, while those of the middle part have been confirmed. His preliminary charts showed patches of land from 95° E. to 165° E., an extent of about 2100 geographical miles. Of this the land between 105° E. and 150° E., about 1350 miles, has now been confirmed.

There are three possible explanations for Wilkes's errors, namely, faulty navigation, excessive mirage together with faulty judgment of distance, and finally a tendency to accept clouds or icebergs as land. The first explanation can be dismissed at once, for his navigation was for those days exceedingly accurate. In the region of Adélie Land, for instance, where he was close to a rocky shore, his latitude is in complete agreement with that of recent navigators. His longitude also appears to be at least as accurate as that of Ross, Balleny, and other explorers of the period. It would be quite unjust therefore to suggest moving about his landfalls in the eastern sector until they coincided with land now known to exist.

Of the other two explanations, the one accepted by Professor Hobbs appears to be a combination of unusual mirage and faulty estimate of distance, an error which is only too common at the present day in the polar regions. It is upon this assumption that Professor Hobbs concludes that his discovery of Cape Hudson on January 19 establishes priority by one day with respect to D'Urville in this sector; Balleny's Sabrina Land in the same sector, discovered two years earlier, being allowed as a "possible landfall." But allowing all that is permissible in the way of mirage it seems impossible to grant that Cape Hudson was real. The nearest land to their ships on that date was distant 2 degrees to the south-south-west, a distance of 120 geographical or 140 statute miles. But Wilkes reported the Cape Hudson land as stretching to the "south-east, and south and south-west," so that the land he was seeing was distant from 140 statute miles up to much greater distances. The most distinct land, quoting his journal, was to the south-south-east. Now errors of distance must be forgiven in so deceptive an atmosphere, but errors of direction simply cannot occur with navigators of his calibre. The only land to the south-south-east of the *Vincennes* position on that day is Oates Land, distant at least 200 miles. It remains for us to decide whether what he plotted as Cape Hudson, 20 miles distant from his ships, could possibly be the real land 140 miles and more away. The nearest land would be that visited by a sledge party

under Madigan on Mawson's first expedition, and the coast there is possibly the most striking part of the whole stretch, consisting for many miles of sheer cliffs of dark columnar dolerite, 1200 feet above sea-level, capped by ice, which rises steadily to the south-westward until at lat. 69° S., 180 miles from Wilkes's position, it is nearly 4000 feet high. Professor Hobbs quite rightly calls attention to the extraordinarily clear air in polar regions, and the effect of refraction in raising distant landmarks above the horizon, but the writer feels that he is expecting too much of this "atmospheric clarity" when he says: "It is quite within the bounds of probability that this [King George V Land] was the land discovered by Wilkes on January 19th, 1840."

Many examples of this ability to see great distances could be quoted. The writer, for instance, has seen Mount Erebus, 13,000 feet, at a distance of 150 miles perfectly clearly and without distortion. Indeed, the most striking feature in such cases is that the land can be recognized by shape, and there is none of the fuzziness usually associated with mirage. At this distance of 150 miles only the upper portion of Mount Erebus was visible, and at least 8000 feet was below the horizon. For Wilkes to have seen land less than 4000 feet high at a similar distance the conditions must have been truly abnormal.

However, the description of his land, together with the drawings made by him at the time and reproduced in his narrative, really settles the matter. The coast of King George V Land may be described as gently sloping and completely ice-covered except at the cliffs. There are no peaks and nothing in the nature of a mountain range. In Wilkes's drawings, on the other hand, reproduced by Professor Hobbs, we see Cape Hudson rising as a pronounced peak with ridges of lesser peaks extending to the eastward. Nothing of this character of land-form occurs along this coast until the region of Mount Sabine and Cape Adare is reached. The Cape is described as "an immense mass . . . towering above an ice island that was from 150 to 200 feet in height." This is the sort of appearance often simulated in the polar regions by clouds, but it is so entirely different from the real shape of the land that any suggestion that it was the real land miraged is practically untenable. In the case of Cape Hudson therefore it appears that, like Stenhouse seventy-five years later, Wilkes was observing a curious cloud effect; but, unlike Stenhouse, he did not see a clear sky the next day to prove that it was indeed a cloud.

The third explanation for Wilkes's frequent "appearances of land" in the first part of his cruise may now be considered, namely, that his eagerness to discover land, and indeed the expectation of such discovery, led him to mistake other appearances for land. We read, for instance, in his narrative that Ringgold "felt convinced from seeing numerous sea-elephants and the discoloration of the water and ice and the report that penguins were heard, that land was near, and thought he could discern to the south-east something like distant mountains." This was when he was in 65° S., and a very long way from any actual land. It is noteworthy that this is the only evidence given in the narrative for the placing of the patch of land, over which Ross sailed the next year, on his chart; which argues considerable readiness to believe in slender indications. Three days later he states with conviction that land was visible from all three vessels, and mentions the fact in curious terms, namely, that

"the appearance was totally distinct from that of ice islands, and the majority of the officers and men were also satisfied that if land could exist, that was it." This refers to the patch of land labelled "Ringgold's Knoll," which was later passed quite closely by Scott without any confirmation. That the belief in its being land was genuine is clear from the next sentence in the narrative. "I mention particularly the names of these two gentlemen [Midshipmen Eld and Reynolds] because they stated the same fact under oath before the Court Martial on our return."

It must be clear to the reader nowadays that these observations were all of clouds or of lines of bergs miraged to unnatural height. Some of the evidence given however was decidedly incautious, such as that of Captain Hudson, who on the same day "believed that most of the ice-bergs then in sight were aground" in spite of the fact that from his own ship his deep-sea lead sounded to the depth of 850 fathoms. Professor Hobbs seems to agree to the rejection of these earlier landfalls, and assigns the discovery of Cape Hudson on the 19th as the first discovery of undoubted land.

This difference of opinion as to the value of the Cape Hudson landfall does not however reflect upon the general value of the article, nor suggest that the later discoveries by Wilkes were not authentic enough. The latter part of the article cites in great detail those authorities who have recognized the whole extent of Wilkes Land, and enumerates its appearances in atlases. The fact that some authorities were generous in the extent of longitude which they covered with the name, while others were not, really proves the point suggested above, that the disproof of the eastern extension of Wilkes Land had made cartographers cautious.

That the question of the extent to be covered by the name requires settlement is clear from the curious compromise adopted on the fine map of the Antarctic compiled by the American Geographical Society, New York, wherein the name Wilkes Land appears twice. The first, covering 60° of longitude "in the broad sense based on Wilkes's recognition of the existence of the continent"; and, secondly, over 4° of longitude, labelled "in restricted sense, according to Mawson." It is significant also that the same chart puts a query opposite Wilkes's Knox Land, Budd Land, and North Land. Professor Hobbs admits that such a usage can only be a temporary expedient, and hopes for a satisfactory solution. To the writer it appears only fair that the name should be applied in the broad sense, but if so a complication arises of one Land including several other Lands, which brings us once more to the problem referred to at the beginning of this note, namely that, there being far too many Lands in the Antarctic, it is time some other term were devised. In the case of Wilkes Land in the larger sense it is open to suggestion that the minor Lands might be changed to Coasts, following a precedent which has been used in the Weddell Sea. Even that suggestion is not free from all objections, but Knox Coast is decidedly preferable to having a Knox Land included within a Wilkes Land.

SHRINKAGE OF THE PEAT-COVERED FENLANDS

MAJOR GORDON FOWLER

AS far as I know no comprehensive record has been made of the amount of shrinkage fenland surface peat undergoes when subject to drainage and cultivation, so I now attempt to present one. The subject should be of interest to archaeologists when considering the stratigraphy of fenland finds, and to historical geographers, drainage authorities, and agriculturists interested in the Fenlands.

The iron post shown in the photograph came from the old Crystal Palace buildings when they were dismantled after the first Exhibition. It is in two or more parts, and was driven through about 22 feet of peat into the underlying blue buttery clay in 1851 or 1852 by John Lawrence, engineer, on behalf of W. Wells, of Holme, then owner of the land. It took the place of one of three wooden posts which Wells treated in like manner in 1848, when he left the top of each of them flush with the level of the land in order to provide gauges whereby the shrinkage of the peat could be calculated after the drainage of Whittlesea Mere, which was undertaken by John Lawrence between June 1850 and the autumn of 1851.[1]

The post stands in Denton Fen, about 20 yards east of a spot on the Holme Lode road, about 880 yards north-east of the railway level-crossing, or about a mile north-east of Holme village, Huntingdonshire. This spot is about half a mile from what was the south-west edge of Whittlesea Mere.

The shrinkage of the peat at this post and the persons who record it are:

	ft.	*ins.*		*ft.*	*ins.*
Heathcote, in 1860	4	9	Wells	3	6
Skertchley, in 1870 ..	7	8			
Heathcote, in 1875	8	2	Wells	7	9
Tebbutt, in 1892	10	2			
The writer, in March 1932	10	8			

In June 1932 I used a geologist's bore to find out the remaining depth of peat at a spot 4 feet west of the column. The result was as follows: 3 feet of black and fairly dry peat, then 8 feet 4 inches of yellow "devil's dung" peat containing 62½ per cent. of water, then blue buttery clay of unascertained thickness. That is to say, a total of 11 feet 4 inches of peat over the clay.

The area around the post was in 1877[2] under cultivation, which probably ceased shortly afterwards because most of it is now covered with fairly large trees (see photograph). Drainage also was probably neglected about that time because to-day the ditches are grown up and the land boggy. The supposed lack of cultivation and good drainage since 1877 is confirmed perhaps by the reduced rate of shrinkage recorded since then.

There can be little doubt that if the drains had been kept clean and the land cultivated continuously, the peat to-day would not be thicker than, say, at

[1]Compare Skertchley, 'Geology of the Fenland,' 1877, pp. 155, 156; Heathcote, 'Fen and Mere,' 1876, p. 89; Bede, "Fen and Mere," *Leisure Hour*, 1877, p. 297; Wells, *Journal Royal Agricultural Society*, vol. 21, 1860; also correspondence between Mr. C. G. Tebbutt, of Earith, and the writer, 1932.

[2]Bede, "Fen and Mere," *Leisure Hour*, 1877, sketch of the post in a cornfield.

most, 6 feet. I know of no cultivated and well-drained peat in the fens thicker than that. Most of it is not more than 3 feet thick.

It would appear then that before the drainage and cultivation of the peat-covered fenlands, the level of its surface in many places was not less than 16 feet higher than at present. Corroborative, but probably less reliable, evidence for this is provided by the fact that the mean of observations made by Dugdale shortly before 1662[1] and Dodson in 1664[2] show that the silt-covered fens which abut on the coast, named Marshland, North Wisbech, and Holland, were then about 5 feet lower than the peat-covered fens behind them, whereas to-day they are on an average about 10 feet higher than those parts of the peat lands which are well drained and cultivated.

With the continuous improvement in drainage and intensive cultivation there seems little doubt that the surface peat will continue to shrink till eventually farming over a large area will be on clay instead of peat, and therefore the nature of the crops and the methods of cultivation changed considerably. Already the shrinkage has provided several remarkable archaeological finds, and more may be expected as it continues its progress.

I am indebted to Dr. R. Garrood for assisting me in making these observations. It should be noted that they modify the provisional statement on the shrinkage of peat given in my note on the Old River Beds in the Fenlands which appeared in the *Geographical Journal* last March (vol. 79, pp. 210–212).

NOTES ON THE FERIN RUWA FALLS

C. R. NIVEN

THE central feature of northern Nigeria, the highlands round and south of Jos known as the Plateau, is now comparatively familiar to geographers, and every traveller makes sure of visiting it. Though to some the top of the Plateau with its bare treeless plains and isolated kopjes is disappointing, the sides are very different; there is to be found country of great beauty around its limits, whether it is a gradual fall as in the north and east or the genuine escarpment of the west and south. Here from the broken country of the Plateau edge illimitable country stretches out before the spectator.

From below, the escarpment presents the appearance of a wall of mountain, broken here and there by deep valleys, heavily wooded. In the south-west the Ferin Ruwa has cut out a deep valley due south till the western side has disappeared in broken hills or minor plateau, while the eastern remains an unbroken wall some 2500 feet above the plain, running more or less north and south. This forms a right-angle with another well-defined wall which goes due west for some 10 miles before turning north again. Practically in this right-angle are the Ferin Ruwa Falls. Though they can be seen under good conditions from as far as 40 miles away they are little known, and those who have reached them can still be readily numbered.

[1] Dugdale, 'History, Embanking and Draining,' 2nd Edition, p. 178.

[2] Wells, 'History of the Bedford Level,' vol. 2, p. 454.

1848 Ground Level
1860 Shrinkage 4 ft. 9 ins.
1870 7 ft. 8 ins.
1875 8 ft. 2 ins.
1892 10 ft. 0 ins.
1932 10 ft. 8 ins.
Depth of peat in 1932 11 ft. 4 ins.

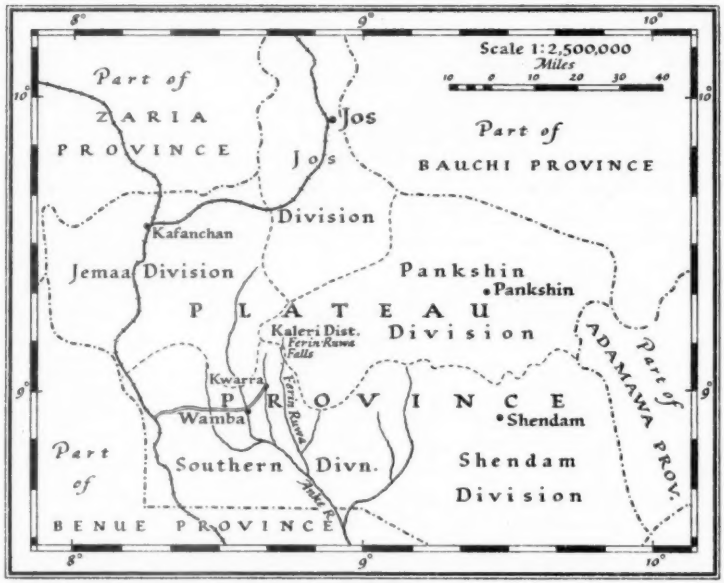
Shrinkage of the peat since 1848 in Denton Fen, recorded on an iron post

Ferin Ruwa Falls in the dry season

Gorge of the Ferin Ruwa above the Falls

Rapids below the Falls

The falls lie administratively in the Southern Division of the Plateau Province and are some 20 miles north-north-east of Wamba, the Divisional Headquarters. They are over 10 miles as the crow flies from a motor road, and the last part of the route is even off the small bush path which skirts the escarpment foot from the little Mama village of Marhai: this path runs nearly due east for about 5 miles, and is left where it meets the Ferin Ruwa itself below the rapids. It ultimately reaches various Kaleri villages on the summit. The distant view shows a vertical but irregular line of white emerging about halfway down the escarpment; above it, from any angle of view, the crest appears to be quite unbroken. The finest view, which gives a comprehensive picture of the falls in relation to their background, is from the path mentioned above when

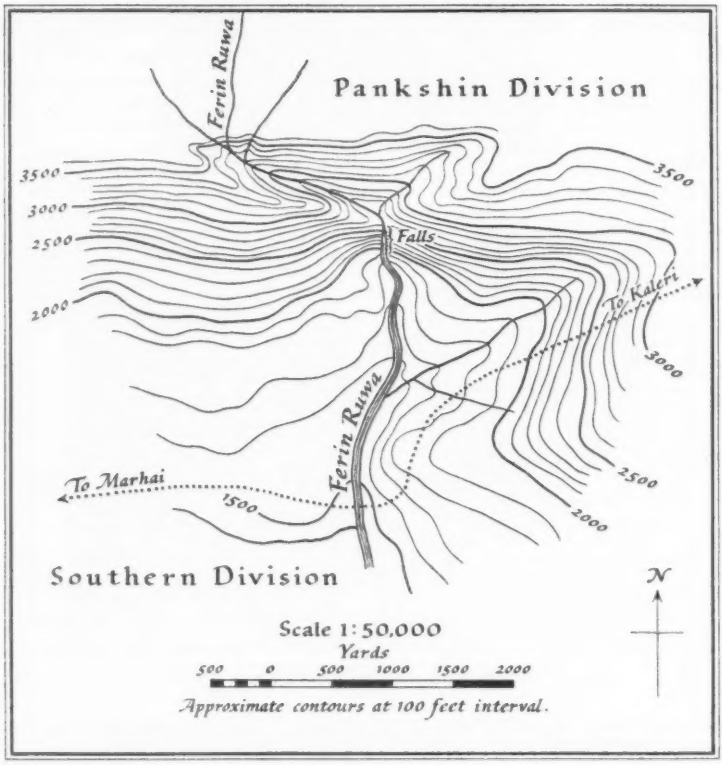


Sketch-map showing position of the Ferin Ruwa Falls

it rises over a spur shortly after crossing the Ferin Ruwa. Narrow at the top and spreading at the foot, even from this point they seem to issue from the very mountain side.

We leave this path before crossing the river and follow the latter northward for a mile, steadily rising through thin forest with glimpses through the trees of the rapids down below, and finally reaching a spot about 300 feet above the crossing. Hence a clear view is obtainable; the wall of white falling water seems to overhang the spectator. The noise makes other sounds inaudible and the air is heavy with spray. Photography is difficult except in the dry season, when, though there is a fair flow, it is not so impressive as during the rains. In the low water the river can be forded on foot across one or other of the rocky bars which form the higher rapids; in the rains it is quite impossible, as the

river is about 100 yards wide and very swift. Were they vertical, as the visible falls are estimated at over 800 feet in height, they would be among the world's great falls, but though parts are vertical the average slope is probably less than 60°. It is possible in the dry season to reach a point about 1200 feet up the eastern side, which is above the falls; from this there is a clear view of the river flowing through a gorge parallel with the face of the escarpment, which accounts for its sudden appearance. This gorge, itself showing a steep slope and in parts very narrow, is under a mile long. At the upper end of it is a pool



Detailed sketch of the Ferin Ruwa Falls

which receives three separate streams, each forming a series of minor waterfalls with a total drop of probably some 300 feet.

The sources of all these falls are in the Kaleri District of the Pankshin Division. The upper reaches are rich in tin and the falls are consequently often discoloured by the tailings from the workings. The face of the falls is over the granite veined with basalt of the Plateau. Below the falls the Ferin Ruwa (which means in Hausa "white river") follows in some places canal-like channels in the granite; the whole valley here is of great beauty and forms a

rich contrast in vegetation to the rest of the Division. It is regrettable that the nature of the writer's duties did not permit more than two hurried visits to these falls and that geographical notes then taken have since been lost.

THE MOUNT EVEREST EXPEDITION AND THE MOUNT EVEREST FLIGHT

THE fourth Mount Everest Expedition is now completely organized and some of the party of fourteen have sailed for India on the s.s. *Comorin* with Mr. Hugh Ruttledge; others followed a week later, and at Darjeeling will meet those members already in India. About March 20 they will leave Darjeeling on the long march through Tibet, probably by the Chumbi valley, as in former years, though perhaps if transport can be arranged by the shorter but less frequented route *via* Gangtok and the Serpo La. They should be at the old base in the Rongbuk valley, above the monastery, some time after the middle of April, and may hope to have established the advanced base at Camp III, or even perhaps at the North Col, by the middle of May. One must pray that this year they will not be driven out again by unseasonable storms, as their predecessors were in 1924, and lose essential time and strength in re-establishing themselves.

The leader has from the Mount Everest Committee only the most general instructions. He will be free to choose his route and his plan of attack; but there is no reason to anticipate that there can be any deviation from the route of 1922 and 1924 as far as the camp below the Northeast Shoulder. No one has ever found a better way: arguments have been heard in favour of climbing the whole way from the head of the glacier by the north-eastern arête, cutting out the North Col Camp with its approach that is usually nasty and has been at times dangerous. But one may conclude from former experience that the North Col has one great merit as a place for Camp IV, if it has not changed very much: that there is a terrace of ice below the crest, which gives some shelter from the prevailing west wind, and might even provide a site for ice caverns in the style of Bauer's on Kangchenjunga.

On the other hand, one must bear in mind the possibility that the topography of the North Col may have changed so much since 1924 that it is no longer a sheltered terrace but offers only a wind-swept crest defended by crevasses. No one has ever, we think, explained why the North Col is as it is. The slopes which it connects are steep and nearly bare of snow. There is no collecting basin for the ice which fills the eastern slopes. It must therefore come from accumulations of snow gathered in the lee of the crest. But why then is it glacier ice in solid masses, deeply crevassed, instead of the névé snow usual in such a position? That is a problem which invites solution: a little burrowing into ice caverns may help in its solution, and it will be perhaps the only geographical problem to be solved by this expedition, which is resolutely unscientific.

There were some who had ambitions to see the photo-theodolite which did such good work in the Shaksgam applied to the detailed survey of the mountain.

The highest summit of the world deserves cartography more precise, if it could not be more beautiful, than the map which M. Charles Jacot-Guillarmod drew from the not too precise surveys and the admirable camera pictures of former expeditions. If two of the party could have been chosen for this stereo-survey, and left to deal with it while the others climbed, that would have sufficed. But it has been from the first the policy of the Committee to keep this year one single object in view, to gain the summit, and nothing has been allowed to divert any part of the strength from that objective. It will therefore be a sombre and strenuous business, with no scientific relief; nor, if we understand the intention of the leader, any of those other diversions which have been a little conspicuous in some Himalayan climbs. No gramophones will affront the silence of the mountains on the pretence that they amuse the porters. No man with a kinematograph camera will be allowed to pose a party for a good shot, still less to stage in a convenient crevasse any scenes of climbing the ice walls that guard the summit. There will be no film at all of standard size, and nothing of the beautiful pictures so boldly made and so little staged by Captain Noel in 1922 and 1924. A few cine-kodaks there may be in the hands of the party, enough perhaps to enliven and elucidate the account of the earlier stages in the operations. But it is doubtful if they will get beyond the North Col. Indeed, if one recalls the events of former years, one seems to remember that though there were V.P.K. cameras on the high climbs, they produced very few pictures. Somervell took a few in both years, being of that resolute character that could pull out a sketch-book also and make a pastel drawing at 26,000 feet: the drawing which is preserved in one of the frames that hang in the corridor on the first floor of the Society's house.

The present expedition has had the good fortune to find in its leader a man who was able and willing to devote his whole time to the job from the day of his appointment early in September, and to have as its secretary a traveller of great experience in the Arctic. It is certain therefore that every detail of the equipment and stores and clothing has been most carefully considered. It was early determined that no great supply of oxygen should be carried: there was only too much reason to fear that the outfit of 1924 had contributed to failure rather than success. But a much smaller and lighter oxygen apparatus will, if circumstances permit, be carried to the highest camp, and then used if it seems desirable, for a final stimulus or restorative.

The expedition will carry a field receiver for W/T reports of the progress of the monsoon, but will have no transmitting apparatus. Despatches will be sent back from the base camp from time to time, with photographs, and the world rights in these despatches have been purchased this year by the *Daily Telegraph*, to which our readers are referred for the latest news of the expedition. The *Journal* will, as in former years, publish each month from April or May a summary of the news.

The expedition is commanded by Mr. Hugh Ruttledge, formerly of the Indian Civil Service, who has climbed for many years in the Himalaya round Nanda Devi. His party is made up of the following gentlemen whose names are given in alphabetical order: Captain E. StJ. Birnie, of Sam Browne's Cavalry, one of those of the Kamet Expedition who reached the summit; Major Hugh Boustead, Commandant in the Sudan Camel Corps, who made an

expedition to Lhonak in the Eastern Himalaya to prepare himself for Mount Everest; Mr. T. A. Brocklebank, stroke of the Cambridge boat for three years, and well known in the Alps; Mr. Colin G. Crawford, who made an attempt on Kangchenjunga in 1920, and was a member of the Mount Everest Expedition in 1922; Dr. C. R. Greene, one of the two medical officers of the expedition, another of the Kamet party who gained the summit; Mr. J. L. Longland, of Durham University, one of the best known of the younger generation of British guideless climbers in the Alps; Dr. W. W. McLean, recently appointed to the English Mission Hospital in Jerusalem, the second medical officer of the expedition, and a member of the Alpine Club; Mr. E. O. Shebbeare, of the Indian Forest Service, transport officer of the Mount Everest Expedition of 1924; Mr. E. E. Shipton, another member of the Kamet party, who recently climbed Mount Kenya; Mr. F. S. Smythe, a member of the Dyhrenfurth Expedition to Kangchenjunga in 1930, and leader of the successful expedition to Kamet; Mr. L. R. Wager, one of Mr. Watkins's expedition in East Greenland in 1930–31, who took part in the strenuous climbing of Mount Forel; Mr. G. Wood-Johnson, also a member of the Dyhrenfurth Expedition to Kangchenjunga, who will be one of the transport officers of the expedition; and Mr. P. Wyn-Harris, who was a companion of Mr. Shipton on climbs in Kenya and Ruwenzori.

By a coincidence which may be either happy or embarrassing, as events will prove, the organization of a British flight to Mount Everest has matured at such a time that a powerful machine, fitted with survey cameras, may fly over the summit from the south while the climbing expedition is approaching it from the east and north. The plans submitted to the Council of our Society by Colonel Blacker in preliminary form in the spring of last year have since been greatly modified and improved, thanks to the generosity of Lady Houston, whose financial support has made it possible to plan the flight without having as its first and compelling object the production of a saleable film. The Council expressed to the Secretary of State for India the opinion that good photographs of the massif of Chomolung from the south would be of scientific interest and importance, and we understand that the principal object of the flight as now organized, under the command of Air Commodore Fellowes with the Marquess of Clydesdale as chief pilot, and Colonel Blacker as principal observer, will be to secure these photographs, vertical and oblique. They will have more importance than can be realized immediately. The problem of plotting a map from a series of photographs in which the ground scale will vary so rapidly must be soluble, but at present cannot be considered fully solved. It is therefore very necessary that the cameras shall be calibrated with all possible precision and the plates carefully preserved after they have served their immediate purpose. The ground control must at present be insufficient: but there is no reason why in some future time it should not be possible to make it sufficient by stereo-survey from ground stations, even at great distances, as for example from the Singalila ridge.

The two expeditions are complementary. The climbers are permitted to pass through Tibet, but have always been refused entry to Nepal. The airmen have received permission from the Nepalese Durbar to fly high over Nepal, and have undertaken not to trespass over the border of Tibet.

The Society will wish both expeditions all success, and will hope that about July it may be possible to illustrate the climbers' conquest of the summit by a photograph from the Mount Everest flight.

SCIENTIFIC RESULTS OF DR. TRINKLER'S CENTRAL ASIAN EXPEDITION

WISSENSCHAFTLICHE ERGEBNISSE DER DR. TRINKLER'SCHEN Zentralasien Expedition. Band I (viii+134+xvi *pages*). Geographische Forschungen im westlichen Zentralasien und Karakorum-Himalaya. By [the late] EMIL TRINKLER; nach dem nachgelassenen Manuskript herausgegeben [by ILSE TRINKLER and GÜNTHER KÖHLER]. Band II (x+196+xxii *pages*). Geologische Forschungen im westlichen K'un-Lun und Karakorum-Himalaya. By HELLMUT DE TERRA. *Berlin: Dietrich Reimer and Ernst Vohsen* 1932. 12×9 *inches; illustrations and maps. M.*32 *and* 44 (*two vols. together M.*70)

IT is sad that the learned author of the brilliant study which forms the first of the two volumes here noticed should have been the victim of a motor accident. The book, which has been edited by Frau Ilse Trinkler and Dr. Günther Köhler, contains admirable descriptions of the country seen during the journey Dr. Trinkler made during 1927–1928 with Drs. H. de Terra and W. Bosshard across the Tibetan Highlands and over part of the Tarim Basin. But it is something much more than a series of descriptions of country, for it contains philosophical discussions of a variety of problems regarding Central Asia to the development of which the author has brought great erudition, wide experience, and shrewd judgment. For such a compendium of geographical observations it is unusually readable on account of the judicious mixture of fact and theory.

The first part of the work is concerned with the lofty highlands lying between the Upper Indus Valley and the Tarim Basin. In the second part attention is directed to the Tarim Basin itself, and to a short synthesis embracing all of Central Asia. The route is at first described stage by stage from Leh on the Indus, *via* the Chang pass, Tankse, Pangong, Shyok, Marsimik, Chang Chenmo, Lanak Lingzitang, Laktsung, Aqsaichin, Yang pass, and Qaraqash to Sanju, and then back *via* Kilian, Suget, Baksum Bulaq, Karakoram pass, Depsang, Burtsa, Sasir pass, Panamik, and Kardung pass to Leh. From there the party followed the well-known route *via* Nurla, Kargil, and Dras to Srinagar. In this region three main topographical units were distinguished. The Karakoram bundle of ranges lies in the south-west, the western Tibetan Highland plateau including Lingzitang and Aqsaichin in the central part and the Kun Lun mountains with their foothills to the north-east. The topography supplies abundant evidence, which is lucidly described, that the present features are a result of ice and frost action upon an older preglacial surface of normal sub-mature character. The original hills and valleys were subjected to extensive glaciation which rounded off some of the protuberances and scoured out some of the depressions. When the ice melted great masses of gravel were deposited in the upper parts of the valleys and much fine-grained detritus was swept out to the plains and deposited as outwash fans or mud-flats. The gravel was then consolidated into conglomerates and fanglomerates, after which an advance of the ice occurred and

lakes were impounded in many of the valleys. At later stages moraines were deposited on the lake terraces, and in some places quantities of young coarse gravel which overlies the lake beds lying upon the older conglomerates. This twice glaciated country was then deeply incised by river erosion towards its margin, although in the more central part river erosion is slight owing to a system of internal drainage into lakes which lie themselves at high altitudes on the central plateau. Many are the great lakes occurring in the highlands, all of them exhibiting incontestable signs of rapid diminution in size during recent times. The earlier larger lakes can be traced through their terraces and show that the remaining lakes are isolated residuals collected in the deeper portions of the original basins. Many of these lakes are brackish, but a few are fresh. Others however which were fresh are now bitter and have strand lines of crystalline gypsum and salt. The lakes Aqsaichin, Lake Lighten, Yeshil Köl, and Pultso occupy basins along tectonic lines and appear to be separated from each other by moraines deposited from glaciers which now appear as small residuals in hanging valleys on the south side of the Kun Lun. In this valley some hot-springs occur.

Careful notes are given regarding moraines, and the evidence is reviewed from which the height of past and present snow-line levels can be deduced. The present snow-line tends to rise from west to east in any one range, and at any one line of longitude is higher in the Muztagh Karakoram than on either the Aghil Karakoram or the Ladak ranges. It is usually about 400 metres higher on the south than on the north side of any range. During the last glacial advance the snow-line lay from 300–600 metres lower in any locality than it does now, and while there is reason to believe that it was much lower still in the earlier one which constituted the Ice Age in this region, no data are available to indicate the precise amount. It is probable however that then most of the plateau was covered by ice and that great ice-sheets filled most of the main valleys. Intense frost action has removed much of the evidence of the glaciation in the Highlands by shattering polished surfaces and erratics. Wind action has also been at work on some features which are etched and aerially polished. But hanging valleys and the typical U-shaped forms of others remain as sufficient witness of the course of events.

At Leh and Gilgit, where meteorological data have been collected, the rainfall is only 3–6 inches per annum, all of which falls in a few days. On the mountains above the Upper Indus Valley precipitation is certainly heavier, and it falls on many more occasions than in the sheltered valley. Adequate observations are lacking in the high region, but the effect of storms from the west seems to be much greater than of the south-western monsoon. The climate is a combination of polar and desertic types. The nights are often still, but the days are windy with westerly gales increasing to a maximum velocity at about 3 p.m. and then declining each evening. In the autumn eddies in the wind pick up sand from the dry river valleys crossing the plateau and transfer it to the surface, forming sand-dunes in more sheltered positions.

Trinkler's work links up with that of Mason and Desio. The Karakoram ranges are Varistian (Hercynian) in age, but have been rejuvenated by late epeirogenic movements which have been accompanied by severe faultings, giving rise to young Alpine land-forms along the old Palaeozoic mountains. The effect of this faulting is well displayed in the topography occurring on the north and south sides of the Qaraqash valley. On the north lie the picturesque young mountain-forms of the Kun Lun chain, while to the south the plateau extends upon which mature rounded forms are found. The extension of the Varistian mountain systems is often difficult to determine, but chiefly on the evidence of distribution of the Carboniferous limestone. Trinkler suggests that the main

Muztagh Karakoram range may be extended westwards into the Hindukush, where young movements have been considerable, and eastwards to the north of Pangong and Alingkangri, Kohanbokang, and Ninchintangla, in which direction the young movements have been less noticeable and the evidence consequently less clear. The Ladak range may extend south-eastwards and correspond to the northern foothills of the Himalaya south of Changpo. Kailas Karakoram plunges south-eastwards and dies out in the plateau near Nubra. The red-coloured range of Aghil Karakoram can be traced beyond the Karakoram Pass across Dipsang and on to Lake Lighten.

To the north of the Tibetan Highlands lies the Tarim Basin, and Trinkler's Expedition confined its attention to the south-western part, the Taklamakan being the principal unit. Visits were paid to Rawak Stupa, Dandan Öilük, Khotan Mazar Tagh, and Choq Tagh, revealing that much of the desert is covered by a hard clay layer upon which dunes rest, and into which watercourses have been cut. These sections show that there are several alternations of sandy-silt and clay in the inner part of the desert, and that near the margin close to the foothills pebble-beds occur, and the mud shows local variations according to the rocks from which it has been derived. Poplar woods once flourished over a considerable area, but in most places they are dead now. Tamarisk bushes and reeds occur along some of the river beds and rarely camel-thorn bushes were observed The dunes chiefly lie close to the stream-courses where vegetation has probably held up the sand. In the inner desert dunes lie largely on the east of the dry channels, but near the margin where westerly winds prevail align the western bank. The sand of the dunes is chiefly fine-grained and angular: millet-seed grains do not occur. A little of the material may have come from the Lop basin, but it is mainly picked up by the wind from the mud-fans of rivers issuing from the southern mountains. Black-sands composed mainly of flakes of biotite lie as a surface layer on dunes east of Dandan Öilük. The disposition of sand-dunes along north and south lines is attributed to the trend of the channels, and where dunes now appear with this arrangement an old watercourse is suspected.

From the ruined Buddist temple at Rawak Stupa and from coins found in the first sand layer the age of the uppermost clay bed is known to be later than about A.D. 500. The extent of the lakes in the Tarim Basin was much greater then than it now is. During a great spate from the hills flooding of a large area must have occurred and the top clay layer have been laid down. Since then local ponds have been formed which have given rise to deposits rich in freshwater gasteropods in places. Areas of sand cemented with gypsum and salt lie in some of the old channels which still carry water so far along them during a few months of the year. At the farthest point to which the run-off water reaches, either above or below ground, if the water table approaches the surface evaporation takes place, causing a concentration of the salts carried down. These salt-sand crusts are psammites. Similar features are presented by the "schoren" of the Caspian and the salt vleis of South Africa. Mountains rise above the flat at Qum Tagh and Choq Tagh, and along the depression between them there are hot springs. This line is said to mark the trace of an important fault. Hills appear again to the south-east at Khotan Mazar Tagh, where young red-beds outcrop. The Tarim Basin is an arid region with a low precipitation, most of which falls in one or two downpours between November and January. These winter months are comparatively still, but sandstorms commence in March, and by June are numerous, a single storm then usually lasting about a week at a time. The temperature is lower during the duration of a storm.

The sequence of events in Eastern Turkistan on the north of the Kun Lun was as follows: (1) Disturbance and peneplanation of the Upper Kainozoic Beds,

(2) deep erosion followed by (3) deposition of gravel and (4) loëss, after which (5) river erosion and the formation of terraces, and (6) infilling of the irregularities with gravel. The loëss seems to have been formed from wind action carrying off the dried-up detritus deposited by the rivers on the edge of the plains during the melting of the glacial ice. The loëss depends therefore upon an earlier glaciation of the mountains, and where this has not occurred, loëss has not been formed.

The evidence collected points to a desiccation of the Tarim Basin, and similar facts are known regarding the Gobi desert. If the Himalaya and Tibetan mass was once lower the effects of the monsoon would have reached farther north than it does now, and would have accounted for the greater precipitation required for the formation of the ice during the Ice Age. The rainfall in the Tarim region would also have been higher. Uplift seems to have affected the whole of the Central Asian Tibetan block. This has resulted in increased precipitation on the edges of the block, and could account for the recent increase in area of the Sea of Aral and Lake Balkhash. At the same time the moisture falling upon the uplifted block has diminished. The general desiccation has been interrupted at intervals by rainy periods. In Central Asia desiccation does seem to have increased during historic times, and to be increasing, but a system of observatories over the region is required before definite proof of this can be given. The vertical movements which have had so much to do with Pleistocene climatic changes have been accompanied by outbursts of volcanic activity, and lavas overlie glacial lake beds on the Keriya Darya. The prevalence of earthquakes, vulcanicity, hot springs, and geysers at the present time suggests that the epeirogenic movements may still be in progress.

The book is illustrated by sixteen plates of photographs and a clear two-coloured printed route map. Apologies are made in the preface for the lack of an index and bibliography, deficiencies which seriously detract from the reference value of the volume. Misprints in the English quotations are common. The book is extremely expensive, and at the price it deserves a better binding.

Dr. De Terra has provided a large tome on the geological results of the Trinkler Expedition, and has presented a timely study of the Karakoram, Himalaya, and Kun Lun in the light of previous work and the facts just discovered in the course of these journeys. It would be impossible to do justice to this important addition to our knowledge of the geology of Central Asia in a short review, but the outstanding features are clear. The Kun Lun is an old range which was uplifted in late Permian times, and except for its northern margin, which was slightly flooded in Eocene times, has been land since. The beds on its northern flank are largely terrestrial early kainozoic, and they have been disturbed and overthrusted by the old mountain mass which has moved slightly from south to north upon them. Since then erosion has produced peneplanation and much extensive terracing. In the Karakoram-Himalaya the southern part where the main ranges occur is built up largely of granite and gneiss massifs also folded in part in pre-Mesozoic times. Between these and the Kun Lun lies a region which formed part of Tethys until Senonian times (Upper Cretaceous), and is now marked by comparatively gentle young folds which expose abundantly Mesozoic strata. It was in the final movements after these folds had been formed that the faulting was produced which broke up the earlier Kun Lun mountains and produced in them their present scenic topography.

The treatise is well illustrated by photographs and many sections drawn as text-figures. It would greatly simplify matters for the reader if these sketches had been orientated in the same way, and should a further edition or a translation of this work be printed it is to be hoped that this blemish will be rectified. The

colour-printed geological map is a route map only, and even in the area south of Yarkand, which the author crossed repeatedly, he has not allowed himself the luxury or succumbed to the temptation of extrapolation between mapped trails. In the first eighty-two pages the horizontal sections are described and the stratigraphy, geomorphology, and tectonics of Kun Lun treated. The next thirty-eight pages are devoted to a description of the geology of the Karakoram and to a short review of the regional geology. In the last seventy-two pages the palaeontological and petrographical results are given. These take the form of short papers by different specialists, as follows: W. Gothan and H. C. Sze on the Jurassic plants; O. H. Schindewolf on the young palaeozoic tetra corals; J. Schuster on the old kainozoic plants of the Indus Valley; K. Staesche on the Trias and Jurassic fossils of Ladak; R. de Vinassa on the Hydrozoa and Corals of the Upper Trias; and G. Fischer on the petrology; while de Terra himself writes on the Carboniferous and Permian fossils. The book is embellished by a good bibliography, but lacks the index which might have been expected in such a comprehensive treatise. The price is prohibitive, but the value of the matter is so great that we should welcome an abridged and less costly edition of the work in English, and hope that such may be part of the fruit of the author's sojourn at Yale University. J. V. H.

REVIEWS

EUROPE

THE FLINT MINERS OF BLACKPATCH. By J. H. PULL. *London: Williams and Norgate* 1932. 9×5½ *inches;* 152 *pages; illustrations and sketch-maps.* 10*s* 6*d*

Blackpatch is one of the middle hills of the South Downs, west of Findon and north of Clapham. Here Mr. J. H. Pull, of Worthing, with assistance from the Worthing Archaeological Society, between 1922 and 1930 has carefully excavated a goodly series of ancient flint mines, floors where the raw material was worked up into implements, dwellings, and barrows, which are disposed on either side of an ancient track which leads from south to north up the slope of a long spur. Very little can have escaped the notice of so observant a digger as Mr. Pull. He describes how the mine shafts and their radial galleries were made by the miners in order that they might get the horizontal seam of nodular flint most suitable for implement making; the kind of implements made (prominent among which is the so-called Cissbury type of celt); the burial mounds and their contents (perhaps the most noteworthy being Bronze Age collared beakers and a variety of charms cut out of chalk); the working floors and the red-deer antler tools of the workers; and the sites of their dwellings. At what period were these mines worked, and by what people? The author marshals his evidence very skilfully, and decides for a period when the Neolithic and Bronze Ages overlap for some centuries in the earlier part of the second millennium B.C.; and the people he concludes were the Round Barrow invaders who moved down the Rhine and penetrated southern Britain about 2000–1800 B.C., gaining ascendency over the Long Barrow folk, and introducing new methods of burial and new types of ceramic. These pages are an important contribution to the subject of prehistoric flint-working, so important that one would have welcomed, and almost expected, more liberal and detailed illustration on the technical side, *e.g.* of the pottery and the numerous flint implements found. On p. 31 we read, "In prehistory the spade is mightier than the pen, and the measuring-tape and compass do not lie." This, we suggest, is a high-sounding phrase which, in its setting, means little. Among minor matters is the spelling of the often-used word "artefract." Obviously it is modelled on "artifact," a non-Latin word, but a convenient invention, which correctly preserves the *i* of such compounds as *artifex*. As mistakes are so common, it is perhaps well here to stress the correct spellings, artifact and artifract. S. E. W.

ARCHAIC TRACKS ROUND CAMBRIDGE. By ALFRED WATKINS. *Hereford* 1932 (*London: Simpkin Marshall*). 9×6 *inches;* 60 *pages; illustration and maps.* 3*s* 6*d*

Most readers will certainly set down the author of this short volume as a crank. As proof that pre-Roman folk made long straight roads from place to place, sighted from prominent landmarks such as burial mounds, etc., the author cites a quotation from the Hebrew prophets, "Straight paths for your feet." Again, since prehistoric man lined out straight roads in this manner, it must follow that when a number of roads converge on a river-crossing, as at Cambridge, and there happens to exist locally a mound, it must necessarily be prehistoric. Of course archaeological evidence is completely opposed to this view as far as the great castle mound at Cambridge is concerned. Again, "Vandlebury camp" (an Iron Age camp on the Gogs a few miles from Cambridge) "seems to have evolved

from a stone circle, for in addition to one track edging it, I found, unexpectedly, two others going through its centre." Doubtless readers will be at once convinced by this argument. The author confesses to only a flying visit to Cambridge; his work has been done solely with published maps. "Herein is a framework for local and field investigation, a *primâ facie* case, for of the two equally important branches of inquiry—map and field work—I offer the first only. I leave the field work to those who by health-giving tramps along the lines indicated will, I feel sure, find new corroboration." Every one must be allowed to have his say, but the choice of title is misleading. The reader might well think he was buying a work which would give the results of researches on the many trackways around Cambridge, instead of a completely uncritical attempt to bolster up a pet theory of the author, pre-conceived and almost certainly erroneous. M. C. B.

ARCHAEOLOGY IN ENGLAND AND WALES, 1914–1931. By T. D. KENDRICK and C. F. C. HAWKES. *London: Methuen & Co.* 1932. 9×5½ *inches;* xx+372 *pages; illustrations, plans, and sketch-map.* 18*s*

Archaeological research has advanced rapidly and along many lines in Britain since the war. The work of excavation has greatly increased, important advances have been made in the typological analysis of tools, dwelling sites, and works of art, while the study of geographical distributions and the attempt to recreate the detailed geography—both the physical conditions and the human dispositions—at various periods in prehistoric times have also received great attention. The last is indeed almost an English speciality whose value in synthesizing and discovering fresh meaning in the archaeological data is only now being appreciated abroad.

This book is a survey of the pre- and proto-historic occupations of southern Britain in the light of the more recent archaeological discoveries, and ranges from the earliest Palaeolithic to Saxon times. The greater part is the work of Mr. Kendrick, but the three chapters on the late Bronze Age and Iron Age are by Mr. Hawkes. Both authors have had to face the great difficulty of presenting in a brief space an adequate account of all the more important individual discoveries and special studies in the form of a readable survey. Difficulties in classification and in the allotting of material to different sections were bound to occur, but by taking broad categories in the earlier periods coherence and ease of reference are not sacrificed to a vain attempt at chronological precision, although it is unfortunate that one of the most important megalithic monuments investigated in Britain in recent years should find its place at the end of a section on round barrows. Mr. Kendrick's chapters are, like all his books, written with an informal mastery that encourages the novice and compels the admiration of the initiate for his wide grasp of detail and clarity of statement.

The book is well illustrated and very fully referenced, and, while geographical problems are dealt with only incidentally with reference to the major phases of our culture history, it is of great value as an introduction to the archaeological material, a secure grasp of which is essential for those attempting to understand the human geography of Britain in early times. C. D. F.

A GEOGRAPHICAL STUDY OF A LONDON BOROUGH: ST. PANCRAS. By M. EMILY COOKE. *London: University of London Press* 1932. 10×7 *inches;* 68 *pages; diagrams and maps.* 6*s*

The moral of this book is that geography begins at home, even in the heart of a great city and in a locality as unpromising at first sight as St. Pancras. It will be news to many that this borough extends up to the "Northern Heights" and includes Ken Wood, part of the great Middlesex forest where stags, boars, and

wild bulls roamed in 1180. On the physical map the massif of Highgate and Hampstead with the prominent spurs of Parliament and Primrose Hills almost persuade us that they are a section of the Himalayas, till we find that the contour-interval is 10 feet and the scale about $1\frac{11}{16}$ inch—why not a simpler figure?—to the mile. This shows how great things can be learnt from small. Miss Cooke takes us to some excellent viewpoints and shows us her kingdom stretched out at our feet. It is to a great extent conterminous with the valley of the Holebourne, the course of which is carefully traced; attention is directed to certain steep streets marking the lateral slopes, and even Riceyman Steps is mentioned. Geological and other conditions affecting settlement are described and the rapid development after 1750 explained. Certain social aspects are then discussed, and the dominant influence of the three great railway termini is well brought out. The population of St. Pancras, now slightly on the decrease, is nearly 200,000, greater than that of the whole of Cambridgeshire; "therefore the human significance of our area [4·2 square miles] is out of all proportion to its size." Though one-fifth of the borough is open space, other parts suffer from serious overcrowding, the causes and remedies for which are touched on. It is a pity that this useful little book could not have been produced at a rather lower price; perhaps this was prevented by the number of maps, which could hardly have been dispensed with. J. H. R.

THE LAKE COUNTIES. By W. G. COLLINGWOOD. New Edition. *London: Frederick Warne & Co.* 1932. 10×7 *inches;* xvi+368 *pages; illustrations by* A. REGINALD SMITH, *and folding map.* 15*s*

It is a relief to turn from the made-to-order type of guide-book far too common in these days, hastily scribbled after a few motor runs and filled in with information lifted from more laborious compilations, to a work of solid excellence based on the intimate acquaintance of a lifetime and an exhaustive study of the local history and antiquities. The late Mr. Collingwood is likely to remain unchallenged as the recognized historian of the Lakes. The district itself has, happily perhaps, but little history in the ordinary sense, but the remainder of the three Lake counties, Cumberland, Westmorland, and North Lancashire, teems with it, and it is the account of what tourists would call the outlying regions that is especially valuable in the book, which shows them how to find there much of scenic beauty as well as of historic interest.

This new edition has a very different appearance from the little 7×4-inch volume published by Dent in 1902, which still retains its value as easily the best, though probably the least known, of the pocket guides. It will be remembered that that book was divided into two parts, the first consisting of eight itineraries charmingly described by the author himself, and the second of chapters by specialists on natural history and sport, followed by a useful little gazetteer. Mr. Collingwood writes in the preface of the new edition that he has found much to alter and "could not have believed our Lake country had changed so greatly in thirty years." In the second part a significant innovation is a chapter on motor-boating. The articles on butterflies and moths (with a long catalogue of species), geology, and yachting, have been rewritten by new authors. The illustrator is also new; his colouring, though attractive, somehow fails to suggest the distinctive colouring of the fells so faithfully rendered in Mr. Heaton Cooper's well-known work. Many of the line sketches are pleasing in an unpretentious way.

There is one serious falling off in the new edition, and that is in respect of the map. The separate half-inch contoured but uncoloured sheets illustrating the itineraries have been replaced by a single quarter-inch map crawling with

the old caterpillar hill-features that should be as dead as Queen Anne. This is a real blot on a fine volume which all lovers of the Lakes will be glad to possess.

J. H. R.

CHESHIRE: TRADITIONS AND HISTORY. By T. A. COWARD. *London: Methuen & Co.* 1932. 7½×5 *inches;* x+366 *pages; illustrations and sketch-map.* 8*s* 6*d*

It is difficult to discover for what particular purpose such books as this are written. From the title one would expect either a fairly serious account of the past history of the county or pleasantly written essays about places and men. The present book suggests rather a series of motor rambles in company with a well-informed owner-driver of a garrulous turn of mind well on in his anecdotage. Mr. Coward certainly has a mine of information, or perhaps one should say an attic full of historical bric-à-brac, with which he makes a display; but selection and manner of display are not his strong points. There is a painstaking account of the recent excavations of Roman work at Chester; it would however be easier reading and more intelligible had a diagram been supplied.

To the surprise of those readers who know this county only by its green meadows as seen from the Liverpool, Holyhead, or Scottish expresses, Mr. Coward's book will reveal scenery as varied as that of Yorkshire itself—lakes, mountains, forests, moors, and crags, they are all there, with much local gossip to boot. But they must be prepared for such remarks as "neither do I affirm nor dispute this derivation, I do not know," or such sentences as "The decorations within this house—once a girls' school, and recently bought—are exceptionally good, and though in a busy town still has its walled garden." Incidentally in connection with this house, the very interesting Church's Mansion at Nantwich, no mention is made of the fact that it is being lovingly restored to its original condition by the present owner.

It is a great pity that Mr. Coward, with his very wide knowledge of his subject, has not disciplined himself to write a much better book than this, as surely he could.

Some of the illustrations are very pleasing, notably that of the Dee marshes. The cock-fighting tables of Lymm are curiosities; the combatant fowls must have found it as difficult to stay on the table as to overcome their adversaries.

C. W. M. B.

DENMARK AND THE DANES. By ETHEL CARLETON WILLIAMS. *London: Methuen & Co.* 1932. 7½×5 *inches;* xii+243 *pages; illustrations and sketch-map.* 7*s* 6*d*

The title 'Denmark and the Danes' cannot fail to attract all who are acquainted with this interesting country and its friendly people; the author writes, indeed, with a zest which shows that both mind and imagination have been captured by her subject. Unfortunately however zest is not a sufficient qualification for the production of a sound and reliable piece of work.

That the historical side should predominate is not perhaps surprising seeing that, at one period, Denmark held sway over all Scandinavia and, in early times, was not without influence elsewhere. The importance of this aspect only makes it the more regrettable that the author has not been able to marshal her facts clearly. In effect, she uses the name of town or village as a peg on which to hang any matter, whether fact or fiction, however remotely connected with the subject. We are therefore handed a jumble of material, historical, archaeological, architectural or legendary, without either discrimination, sequence, or plan. This confused treatment would matter less were the diction faultless. But grammatical

errors abound: singular nouns are used with plural verbs, the person changes without transition from third to first or even to second; verbal repetitions and misrelated clauses occur throughout. The latter are sometimes amusing, for instance: "St. George . . . hacks a prostrate dragon with his sword, which utters a dying groan."

Chapter IX, Krabbesholm, must be considered apart, as here the author breaks free from her previous incoherence and gives a concise and lucid account of the Danish Folk High School, an experiment in adult education, preceding by more than half a century a similar development in our own country, namely Sawston Village College.

The illustrations, which are ill-adapted to the size of the page, are reproductions of snapshots and represent mainly buildings. The map within the cover is a commendable feature.

ROME, OF THE RENAISSANCE AND TO-DAY. By Sir RENNELL RODD. *London: Macmillan & Co.* 1932. 10×7 *inches;* x+304 *pages; illustrations* (by HENRY RUSHBURY), *and plan.* 25*s*

This book will be a boon not merely to the long-term visitor to Rome, but to the reader at home who has only a hazy knowledge of the city, for Sir Rennell Rodd has succeeded in making his systematic, almost house-to-house survey of the city genuinely interesting. Possibly this is due to his own well-regulated enthusiasm. He gets you along at a brisk pace, dealing shortly, but adequately, with the chief features of the building in hand and telling you just enough about its inhabitants or its architect to interest you without delaying you too long. He tackles his subject region by region, and, since he can remember the Rome of Pius IX, he is able to grasp the significance of the vast changes of the last half-century. He wisely leaves the classical period, upon which so much has been written, almost entirely alone, thus giving us a book about what might be called the modern city, and no less wisely he leaves well-known monuments to the guide-books. He has a special eye for the architecture of his subject, and can appreciate the best of the Baroque. It would be a small compliment to say that the book is a remarkable feat for a busy ambassador. It has obviously been a labour of love, and in these days it is worth noting that the necessary information could only have been acquired on foot. The out-of-the-way knowledge is wonderfully varied. How many people know that the British flag floated over the Capitol in 1799, and that Troubridge was then granted the right to add the crossed keys to his arms for his services in driving off the French? It is of course possible to note an occasional omission, as, for instance, that the inscription over the Porta del Popolo was put up for the reception of Queen Cristina of Sweden. The book would be worth getting merely for the sake of Mr. Rushbury's delightful illustrations. L. C.-M.

A WAYFARER ON THE RIVIERAS. By E. I. ROBSON. *London: Methuen & Co.* 1932. 7½×5 *inches;* x+196 *pages; illustrations* (by J. R. E. HOWARD) *and sketch-map.* 7*s* 6*d*

Possibly the chief use of this desultory little book will be to help the proposing visitor to the Riviera to choose the place where he would settle or wander, unless of course he is going to one of the well-known centres. Mr. Robson knows both the Italian and the French Riviera intimately and has something to tell you about almost every village along that lovely coast, but he covers far too much ground to be an adequate guide for any one on the spot. Though he is a walker by preference, he readily recommends other means of progression to save time or get over dull country. He points out how much less varied is walking on the con-

tinent without the field-paths of England. He manages to tell us something of the art-treasures and the history, of which he obviously knows far more than he can use in these pages, as well as of the customs of his district. His advice is, as a rule, sound and practical, but it is odd to find him talking about the delicious bean called *finocchi*, apparently ignorant of the fact that this is the Italian for the fennel which he praises raw three lines farther down. L. C.-M.

SO THIS IS POLAND. By F. W. von OERTZEN. Translated by R. T. CLARK. *London: George Allen and Unwin* 1932. 9×5½ *inches;* 288 *pages.* 10*s* 6*d*

This vigorously written survey of the history of the new Poland by a German journalist deals largely with the treatment of minorities in that state. It is not surprising therefore that his attitude is by no means impartial, indeed the author maintains that "there is really no such thing as objective historical writing." The English reader, making allowance for this standpoint, will find much to interest him in a subject which has received little attention here. The characteristics of the new state are remarkably of a piece with those of the pre-partition Poland. The intense patriotic spirit, the disinclination to work parliamentary institutions, the only too-well-founded distrust of her neighbours, have all endured. This is not the place however to discuss political questions, though it may be regretted that in a sketch of national life these should receive such emphasis to the exclusion of other activities. A map would have been of assistance in following the account of military operations. G. R. C.

DAWN IN RUSSIA. By WALDO FRANK. *New York and London: Charles Scribner's Sons* 1932. 7½×5 *inches;* 272 *pages.* 8*s* 6*d*

No title could better describe the belief underlying the author's review of the impressions left on his mind after a short personal investigation of present-day conditions in Russia, that the future holds promise of success. For though 'Dawn in Russia' has as a sub-title 'The record of a journey,' it deals almost entirely with the people and contains few descriptions of the land.

Though Mr. Waldo Frank claims to be a member of no party his sympathies were evidently inclined towards Communism long before he journeyed to Russia, but that in no way prevented him from seeing and writing about the misery and hardships which undoubtedly exist. Few who have visited Russia will be inclined to deny the truth of the remarkable word-pictures he draws of life in town and country—some of the best are perhaps his vivid descriptions of life on the banks of the Volga—though some will disagree with his conclusion, that the driving force, which he seemed to feel among the people even in his first hour in Leningrad before he had formed any contacts with them, was their own will to succeed and not compulsion from above. Not that the compulsion of the Communist party is denied. Far from it. Yet the author is ready to believe that the impulse which makes the people work is the Communist ideal, at the same time describing the typical townspeople as "men servilely ready to be led—even to their own destruction."

Turning to the old, now submerged, so-called upper classes, he has little hope of their regeneration, but their children will have embraced the new beliefs, and as for the Muzhiks they are still "barbarous" and present a difficult problem, but "their children—the inevitable rulers of to-morrow's Russia—will no longer be Muzhiks; they will naturally have acquired the viewpoint of a proletariat of farm workers." Conviction had been arrived at, that "The youth of Russia have accepted Communism. They alone have begun to live it as a conscious way of life." But when asking himself the question, "Is true Communism coming to the U.S.S.R.?" the author replies, as do most of those who have studied Russia,

"I do not know," for from the state socialism of to-day the way forward to Communism is not clear. Nor can the immediate intentions of the Dictators of Russia be known, but Mr. Frank cannot believe that political oligarchy (always a possible outcome of State socialism) could succeed in view of the prospective universal education of the Russian peoples. One may well ask what will be the day which follows the dawn?

A short review of such a book as 'Dawn in Russia' can only hint at its contents. Few questions are ignored, and to their solution has evidently been brought the results of long years of study on social subjects though fairly acknowledged lack of acquaintance with the Russian language. No reader, whether in agreement or not, will be likely to read the book carelessly, for to its reading each must bring his own estimate of values. And he need not fear that the Russian method will be held up as an example to be followed by other countries, for while advocating to Americans, who are his own people, loyalty to the social aims of Russia, as he sees them, the author urges no imitation of its ways and dogmas. E. W. N.

ELSASS-LOTHRINGISCHER ATLAS. Edited by GEORG WOLFRAM and WERNER GLEY. 16 × 11 *inches;* 45 *sheets.* Together with ERLÄUTERUNGS-BAND zum Elsass-Lothringischen Atlas. 10 × 7 *inches;* viii + 168 *pages. Frankfurt: Selbstverlag des Elsass-Lothringischen-Instituts* 1931

This atlas of "landforms, history, cultural and occupational activities" includes 45 plates with 115 maps and diagrams. Its object, state the editors, is to present, from a scientific and unprejudiced point of view, the political, commercial, and cultural development of Alsace-Lorraine from prehistoric times up to 1918. Cartographically the maps leave little to be desired, being well coloured and clearly printed on good paper. As a contribution to history and geography they provide a very comprehensive survey and form a model for any similar regional atlas. In addition to the more familiar maps of territorial changes, there are others more rarely to be found; on Plate 29, for example, is marked the distribution of the different groups of place-name terminations, and both this and the maps showing architectural and linguistic distributions are particularly interesting. The diagrams illustrating town plans and town growth form a useful adjunct to the collection.

Accompanying the atlas is a volume of text which provides comments and explanations, and in some cases these are necessary owing to the very thoroughness of the maps. Plate 33, which records the human settlement of the area, including sites which have disappeared or lost their importance, would have benefited by a more selective treatment of material. It might have been advisable too to supplement the only relief map in some way. And as a complete work, the atlas omits the fact that the development of a region cannot be explained in terms of the region itself, and some more maps showing the relation of Alsace-Lorraine to the surrounding country would have been welcome. But as it stands it is a considerable achievement. The editors hint at a possible further development of the scheme, and indeed more work of this calibre would be valuable to historian and geographer alike. H. C. D.

THE TALE OF ATHENS. By ELLEN S. BOSANQUET. *London: Methuen & Co.* 1932. 7½ × 5 *inches;* x + 202 *pages; illustrations and plans.* 7*s* 6*d*

Guide books describe the monuments of Athens; but Mrs. Bosanquet gives the passing visitor, whether in body or in spirit, a brief account of the history of the city. To this description she brings the valuable authority of some years' residence, far more important when writing of the city itself even than when describing one of its cultures or peoples separately. The prehistory of Athens

is dark and not easily summarized, based as it is upon legend, myth, and scanty remains; but the author well conveys its nature, and sometimes its vagueness and confusion. The historic age, so much popularized, is no easier to treat. Mrs. Bosanquet lets her imagination and knowledge play upon the intimate but sporadic information of the ancient sources, and describes their times in a series of idylls, with an occasional Plutarchesque scene, strung upon a thin thread of history. This method has every advantage of vividness and entertainment: its pitfalls are deep, but the author has avoided them; and if the pictures seem idealized, this arises not from an unbalanced view, but from a proper consciousness that what is important about ancient Greece is not its smallness but its greatness. To the many who have some idea of the classical age of Athens the more interesting part of the book will be the second half. Athens becomes a university city, the mother of academic culture and the mistress of millionaires and emperors. Then the university is closed; there remains only a small town, elegant but unimportant, slowly amassing her three hundred churches. Still we can recognize her, until at the beginning of the thirteenth century a new period begins. Now the Duke of Athens rides "avec belle chevalerye" to the grand jousting at the Isthmus. His castle stands on the Propylaea, and the monastery of Daphni is affiliated to the Abbey of Bellevaux. This fantastic Shakespearian pantomime collapsed, as it had begun, suddenly and completely. Greece was enfolded in the Ottoman empire, and was still Turkish when the inflow of European travellers began again. So the author leads us on, through the war of liberation and the modern kingdom, up to the present day. The book never flags. In the first half the reader may perhaps, according to the measure of his knowledge, find the matter too familiar to be interesting in summary, or the manner too allusive to be comfortable to follow; but once the author has shaken off the weight of the classical period she is consistently entertaining. The twelve plates are well chosen, and really illustrate the text. D. A. G. H.

ASIA

THE PROBLEM OF THE NORTH-WEST FRONTIER, 1890–1908, with a survey of policy since 1849. By C. Collin Davies. *Cambridge: University Press* 1932. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii + 220 *pages; maps.* 12*s* 6*d*

The question of the north-west frontier is of such vital importance for India that this detailed study of its history during a critical period is very welcome, particularly since its author was able to consult hitherto unpublished material, and has discussed a vast body of evidence with scholarly impartiality. Three factors are involved in a study of this question—Russia, Afghanistan, and the present frontier territory of varying width, stretching for about 1200 miles from Chitral to Baluchistan. Dr. Davies treats of all three, although of necessity he deals in greater detail with the last. Here a broad distinction must be made between the Sind frontier and that "heritage of anarchy" which came with the conquest of the Punjab. The successful solution of the problems of the Sind frontier suggest that a repetition of Sandeman's methods elsewhere would have had equally good results. Sandeman was fortunate in that geographical conditions were less difficult in Baluchistan than farther north and that he had to deal with "tribal chiefs powerful enough to control the tribes for which they were responsible." Yet if he had to resort to force but rarely it was because he "realized that the first essential was to dominate the Baluch country with troops" and to cut off the tribes from a safe retreat in Afghanistan. Hence the significance of the Bori and Zhob valleys. Dr. Davies claims that for a variety of reasons this policy was

impracticable throughout the whole frontier. Geographical and other factors, adding to the complexity of the problem, have made the adoption of different policies inevitable.

In his detailed discussion of frontier history the author brings out the significance of the geographical factors. They are largely responsible for the poverty and unemployment question; they provide the Mahsuds with almost inaccessible mountain retreats which dominate the Gomal and Tochi routes to Afghanistan; they tempt or drive the Afridi to plunder the caravans using the Khyber pass; and they play a great part in determining the nature and the time of tribal risings and of punitive expeditions. Dr. Davies asserts that environment has shaped the character of the frontier tribesman. To the geographical factors which make for unrest must be added others of a different kind, and in an excellent summary, with which the book ends, the author shows how political activity, both in England and elsewhere, and the conflicting problems of tribal control and imperial strategy have prevented the adoption of any consistent frontier policy. He suggests a number of improvements, particularly in lines of communication, and concludes "that the hope of permanent peace on the frontier lies in the spread of civilization both in Afghanistan and on the Indian borderland, and in the removal of an aggressive Russia." A valuable bibliography is added and also three maps which would have been more instructive had they shown the geographical features as well as Dr. Davies describes them. J. N. L. B.

GROWTH OF TRADE AND INDUSTRY IN MODERN INDIA: an introductory survey. By C. N. VAKIL, S. C. BOSE, and P. V. DEOLALKAR. *London: Longmans, Green and Co.* 1931. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii + 398 *pages.* 13*s* 6*d*

This volume is one of a series of studies in Indian economics under the editorship of the Professor of Economics in Bombay University. The authors believe that "when foreign investment takes the form of companies (incorporated outside India) which are owned and managed by foreigners, it results in an exploitation of the resources of a country to enrich the foreigner without adequate benefit to the people of the land," and they advocate a policy of "judiciously restricting the imports of manufactured goods and the exports of raw materials." What India would have suffered in the past without the free supply of foreign capital they do not suggest, but in the matter of tariffs they are prepared to overlook "the negligence of more than a hundred and fifty years" on the part of the Government and to start afresh with the present policy of Discriminating Protection.

The main body of the work is divided into four parts dealing with articles of food and drink, textiles, minerals, and other articles. The treatment of the various items is, by design, far from uniform, but the authors discuss much useful statistical material collected from official sources and their work is of value if only for the facts they present. At the same time their methods and their style involve them in needless repetition and in ambiguous statements. Thus, in the section on coal, which might with advantage have dealt with the mining industry as well as with the coal trade, the relative importance of the imports is given incorrectly on p. 233 and correctly on p. 242. Again, the imports of iron and steel goods from Belgium are discussed without mention of the difficulty of discriminating between Belgian manufactures and those from other countries shipped through Antwerp. The old question of the export of oilseeds is introduced, and the authors assume that the crushing of seeds in India would be more advantageous than their export as seeds. But it is certain that India could not now use the oil so produced, it is at least doubtful if the oil could be so cheaply or so efficiently transported as the seeds, and it is probable that established seed-crushing industries outside India would look elsewhere for their supplies if India

ceased to export seed. As the authors are fully aware, India has no monopoly of this product.

In general, insufficient attention is given to the difficulties in the way of Indian industrial development which arise in India itself, and in a future edition, which the authors contemplate, space might well be given to these problems. They would also do well to avoid phrases and words which carry implications which may not be intended. A bad case occurs on p. 205, where the authors say that "even Mr. Moreland tries to prove that blankets and kamblis were not in common use in the days of Akbar." Perhaps no slur is meant, but it is no argument against Mr. Moreland's case to say, as they do, that "the blanket was an indispensable part of the equipment of the Maratha soldier in the Deccan," and to back this up with a reference to travels in south India by Dr. Buchanan in the early years of the last century. There is enough good material in this book to make it appeal to the new India without the introduction of statements which have a political flavour. J. N. L. B.

BURMA AND BEYOND. By Sir J. George Scott. *London: Grayson and Grayson* 1932. 9 × 5½ *inches; 350 pages; illustrations and map.* 18*s*

An author presumably addresses a particular audience; otherwise, though he might keep a diary, he would not necessarily publish a book. But it is difficult to say just what section of the public Sir George Scott had in mind when he wrote 'Burma and Beyond.' It is rather too stiff reading for those who do not know Burma; on the other hand, those who have some little acquaintance with the country may feel that it is not sufficiently up to date for the student of modern, still less of the coming, Burma. Thirty years ago the author's name was familiar in the province; to-day the gloss has worn off a little, for new authorities arise. The reviewer can think of at least three men, resident in Burma to-day, who are more in touch with the tribes, and who, in his opinion, might have done the work better; all the prestige of Sir George Scott's name cannot compensate for the fact that he left Burma many years ago.

But the book deals mainly with the Beyond—that part of British Burma which is inhabited by non-Burman races and tribes, and which has not changed much even in thirty years; namely the Shan Plateau and Karenni to the east of the Irrawaddy, the Chin Hills to the west of the Chindwin, and the Kachin Hills of the far north. Only the Myelat and the Shan Plateau are comprehensively dealt with however; a little-known region about which the author knows as much as any one. The chapter on the Wa is particularly good, and will be welcomed by all interested in Burma. There are other good chapters, notably those on the Karens, written with something of the author's earlier style and sense of humour. Elsewhere the style is ponderous and involved. There are too many almost incomprehensible paragraphs; too many obscure allusions; too many archaic spellings. What, for instance (or who?), is "a Horne Tooke Diversion of Purley etymology"? and why "Mèkhong" for the now familiar Mekong? The number of people who know what *pauk* and *ye-ma-ne* are is limited; those who want to find out could more readily discover what Butea and Xylia are. Nor is the author's geography sound: it is either faulty geography or faulty English to say that "the Irrawaddy, the Salween, and the Mèkhong all rise in a small area." Moreover Sir George Scott expects too much of his readers. In the very first chapter we leap about in space and time till we are dizzy. Not every one will agree that the Burmese came from where "western Tibet meets northern India," and if they did they were not then Burmans. This is like saying that the English came from the Mediterranean. The author should put us more gently at our fences.

The reviewer does not forget that Sir George Scott wrote 'The Burman,' and that he here bravely essays an even more difficult task, which no one else has had the courage to face. If he has failed to live up to his own standard, at least that standard was a high one. In an unusually modest jacket puff the publishers say that the information now given to the public was hitherto accessible "only in the pages of a voluminous and unobtainable Government Gazetteer." The reviewer acquired his copy of that book many years ago, and regards it as one of his most treasured volumes; he cannot but prefer it to the present book.

Many of the photographs in 'Burma and Beyond' are excellent, and some of them are perhaps unique. The map is not good; and the covert sneer against the late Fielding Hall, on p. 323, is unworthy. F. K. W.

BY DESERT WAYS TO INDIAN SNOWS. By ALEXANDER JACOB REYNOLDS. *London: Unicorn Press* 1932. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 328 *pages; illustrations.* 15*s*

The conclusion that this volume is intended to be more of a political than a geographical or travel book is borne out by the absence of any map. The author's leisurely journey to India by way of Syria, Palestine, Trans-Jordan, Mesopotamia, and Persia followed for the most part routes which have in late years become familiar and have—so he makes one feel—lost some of their charm in consequence. The desert route, for instance, between Damascus and Baghdad along which, we read, now travel some five hundred cars a year, will be remembered by those who crossed only ten years ago as unmarred by any wheelmark till long after Rutba Wells had been left behind. What is probably the least familiar part of the journey, *i.e.* from Bushire through Baluchistan to Karachi, is however dismissed in a page, the country being described as "arid, scorching hot, incredibly mountainous and sterile," and the indigenous population as "reserved and unfriendly."

Probably the author's chief object while travelling was to satisfy himself on social and political questions, and many of his conclusions are clearly set out. He writes, for instance, that he put himself to "no end of trouble" to get to the bottom of popular feeling about the respective mandates of France and Great Britain in Syria and Palestine, and decided for reasons that are given that France had failed in Syria and apparently that Mesopotamia might have been a fairer land in which the Jews could practise their agricultural skill. A short stay at Kuwait, on the Persian Gulf, offers an opportunity for a chapter on conditions past and present in Arabia and on various travellers in that land up to the time of Lawrence. From Kuwait the journey proceeded by way of Dizful, Masjid-i-Sulaiman, Isfahan, Shiraz, Bushire, and Baluchistan to Karachi.

Two-thirds of the book are devoted to India as seen on this and previous visits, and contain descriptions of many well-known towns and districts, their peoples, customs, and religions, as well as of two remoter places, Jaisalmer and Hardwar, and fifty pages on present-day Indian questions, from what point of view may be gathered from the following quotation: "The greatest act of abject abdication of any people in the world's history is the only term that adequately describes the assent of the last Socialist Government to the recommendations of the Round Table Conference." Some portions of the book have previously appeared in print either in British or American papers. E. W. N.

LAND AND LABOUR IN CHINA. By R. H. TAWNEY. *London: George Allen and Unwin* 1932. $9 \times 5\frac{1}{2}$ *inches;* 208 *pages.* 7*s* 6*d*

This important work is an expansion of a 'Memorandum on Agriculture and Industry in China' prepared for the Shanghai Conference of the Institute of Pacific Relations in 1931, and embodies the results of a considerable period of

study in the country under the Institute's auspices. Mr. Tawney worked in close touch with most of the organizations engaged in research into Chinese economic conditions, notably the Department of Agricultural Economics and Rural Sociology of the University of Nanking, which is carrying out an important agricultural survey of China, the Institute of Economics, University of Nankai (Tientsin), and the Institute of Social Research, Peiping. Most of the statistical material available for the appraisement of the present phase of China's economic development is here lucidly marshalled and reviewed, and Mr. Tawney brings to bear upon its interpretation and the indications which it affords for estimating the economic destiny of the country the penetration, insight, and power both of analysis and synthesis which have distinguished his studies of the economic and social structure of western society. At the same time he is keenly alive to the fundamental difference of background, and, while he shows that China has much to learn from European experience, he neither desires the westernization of the country nor believes that the solution of her problems is to be found in the adoption of a programme of large-scale industrialization. Primarily it lies for him in the readjustment of the life of the countryside, through the development of communications—the *sine qua non* of all advance—co-operation in credit and marketing, the consolidation of dispersed fragments of land into compact farms, and the restriction of population. "Famine is the economic, civil war the political expression of the pressure of population on the means of subsistence." Wisely directed primary and mass education is the key to the regeneration of Chinese rural life, and on the subject of the relationship of education to essential economic and social reforms Mr. Tawney, whose most recent visit to China was in the service of the League's advisory educational mission, is particularly instructive. A valuable commentary on the present educational system is included in the final chapter.

So far as industrial development is concerned Mr. Tawney believes that the path of wisdom for China lies rather in the development of secondary industries for which she has natural advantages and an abundance of traditional skill than in the attempt to rival western Europe and America in large-scale metallurgical output for which her physical resources are limited and which require methods of mass-production unsuited to the genius of her people. He endorses the views of Professor J. B. Taylor, and others who have been studying the problem at close quarters for many years, that there is a sound economic basis for the development of rural industries in close relation to agriculture. The right course, he argues, is "to retain, where possible, the small productive units which are the traditional form of industrial organization in China, but to secure for them the advantages of large-scale methods in finance and commerce, by taking steps to promote the formation of co-operative societies for credit, marketing, and the purchase of raw materials." Considerable importance is attached to the recent formation of a National Economic Council, as a promising example of co-operation between the Chinese Government and advisers supplied by the League. It may be hoped that one of the primary functions of the Council will be to bring reconstruction to earth and work out a scheme of priorities, beginning with communications.

This book is primarily, as its title indicates, an economic survey, but the valuable last chapter, which is an addition to the original memorandum, puts the economic problem in its true perspective. To modern China, as Mr. Tawney says, the maxim "l'économique prime la politique" hardly applies. "Economic progress is paralysed by political anarchy and will continue, till order exists, to be fitful and intermittent. The first problem therefore is to create an efficient system of government." China's political disorders are not indeed unique.

"They are the characteristic . . . of a phase or civilisation, from which other societies have painfully emerged, but from which owing, first to her long isolation, and next, to its abrupt termination, China is only now emerging." There is moreover an underlying cultural unity more profound than that of many societies which have developed a highly centralized government. "In no country is the impression of the nation not merely as a territorial unit . . . but as a living personality, more insistent and irresistible." But the problem is complicated by the vast size and geographical conditions of the cultural terrain. Mr. Tawney pictures the Nanking Government and the provinces of the Lower Yangtze Basin as analogous to the position of Paris and the Ile de France in Mediaeval France. Here is the real heart of China, and in concentration on the task of establishing good government in the home provinces lies, as he believes, the best hope of ultimately achieving the political unity of the whole.

This is certainly one of the most helpful books for the understanding of the Chinese problem that has yet appeared, and merits a wide publicity in China no less than in England. P. M. R.

CARAVAN CITIES. [Petra, Jerash, Palmyra, and Dura.] By M. ROSTOVTSEFF. Translated by D. and T. TALBOT RICE. *Oxford: Clarendon Press* 1932. 9×5½ *inches;* xiv+232 *pages; illustrations, sketch-map, and plans.* 15*s*

Archaeology is always at the mercy of the landowner, and one of the direct results of the release of a great part of the Near East from ignorant rule has been that not only fresh sites, but new chapters of ancient history have been opened up, and a large aspect of ancient life has been made intelligible, along the desert margins of Greek and Roman culture.

Such a field for new work is the desert trade of antiquity, and its headquarters in the Caravan-Cities, such as Petra, Jerash, Palmyra, and Dura. The Caravan-City, as Professor Rostovtseff calls it, has come into existence in most of the regions favourable to its highly special mode of life, curiously dependent on friendly relations with distant neighbours, and at the same time living its own life more independently than most of them, and at most with an eclectic culture not easy to describe or attribute to its sources. But there are degrees of independence politically, and of eclecticism in habits of life. In Saharan Africa, under stricter oasis conditions, the Caravan-City, beginning in the later Stone Age, has maintained itself till to-day; in Central Arabia, less effectively, since there are alternative ways round the desert instead of across it. In Central Asia the fate of the Caravan-City has been different again, recalling the relations between Palmyra and neighbouring Great Powers. But though the group of Caravan-Cities which Professor Rostovtseff has brought together for study constitute in some respects a distinct variety, and in particular came to an end in consequence of a particular and regional shift of conditions, they illustrate well enough the general life-history of that curious type of community; and the historical survey of caravan trade in general, with which this book opens, though mainly based on these examples, is a valuable introduction to a subject which has not attracted hitherto the close attention either of historians or of geographers, as the bibliography here shows.

Within a general likeness these four cities differ nevertheless in function, and still more in their history: Petra and Palmyra had (at all events for a time) the full enjoyment of caravan conditions, and prospered accordingly. Palmyra however only attained to full maturity late and for a short stay; Petra, on the other hand, with ups and downs, maintained its independence for centuries. Jerash, on the other hand, began late, acquired its interest in caravan trade later still, and as a second thought, and does not seem to have been ever more than a regular halting-

place on an important through-route: there is no important junction there of trade from different directions; the colonnaded "market-place," stately as it is, was a *khan*, not a *bazaar*. Dura, in spite of its exposed and isolated position, seems to have been throughout more of a colony or outlier of exploitation than either a *khan* or a *bazaar*: "it was a small provincial city lost on the boundaries of two civilizations, the Greek and the Parthian" (p. 158); and its interest is rather in the special mixture of habits and notions, none of them peculiar to caravan-city existence, than in its function as an organizer of trade, or a parasite on it.

It must be remembered that though since the War a good deal of work has been done on all these sites, it has necessarily been preparatory, and is still for the most part unpublished. But for this very reason a first survey of results of this kind, and such a graphic setting of the geographical and historical scene, is most welcome. Probably no one except Professor Rostovtseff could have written such an essay, and certainly no one could have reconstructed the reality from fragmentary traces so surely and vividly.

The translation reads well, but there are some odd phrases and obscurities, and more mis-spellings or misprints than one expects in an Oxford-printed book.

J. L. M.

DIVERSIONS OF AN INDIAN POLITICAL. By Lieut.-Colonel R. L. KENNION. *Edinburgh and London: William Blackwood & Sons* 1932. 9×5½ *inches;* viii+324 *pages; illustration.* 10*s* 6*d*

This is a collection of sketches of the personal experiences of an officer of the Political Department of the Government of India that will convince the reader of the truth of the author's assertion that the department offers a career which for variety, interest, and entertainment bears comparison with any in the Empire. Colonel Kennion takes us with him from the hot plains of Central India to the frigid plateau of Western Tibet, and from the mountains of Chitral, Gilgit, Ladakh, Kashmir, and the North-west Frontier to Seistan, the Tigris delta, and North-west Persia. Apart from anecdotes of very varied shooting experiences, he throws sidelights upon campaigning on the frontier, in Seistan and the Persian Gulf, and gives a graphic account of service with the remnants of the Russian expeditionary force that operated in Persia under Baratov and Bicharakov—a little-known phase of our widespread activities during the Great War. Six chapters are devoted to sport and politics in the kingdom of Nepal, while one of the most interesting is that in which he narrates his adventurous trek from Leh to Gartok, to deliver to the Governor of Western Tibet an autograph letter from Lord Curzon to the Grand Lama of Tibet.

These sketches, which show marked literary skill and descriptive power, and contain many shrewd observations, based upon long experience and intimate association, on Oriental character and conditions, and more specifically on the trend of current events in India, should be read by all interested in such matters.

C. E. A. W. O.

IL MIO VIAGGIO NEL TIBET OCCIDENTALE. By GIOTTO DAINELLI. *Milano: A. Mondadori* 1932. 10×7 *inches;* xvi+404 *pages; illustrations. L.*40

Professor Dainelli, as geographer and naturalist to the famous Italian Himalayan Expedition 1913–1914, was engaged in numerous activities which were spread over a large area. There was however one area which he did not visit, the Nubra valley from its junction with the Shyok valley to its origin in the Siachen glacier, and it is a popular account of a journey in 1930 to this part that the author here gives us. He does not attempt to deal with the scientific side of his work, merely describing everyday experiences. It is however a book which should be read by all who intend to travel in these parts.

The author unfortunately has devoted more than a quarter of the book to Leh and the journey thereto, which has been described many times before and is not very interesting, for he seems to have had the same experiences as all travellers, whether in crossing the Zoji La, visiting monasteries, or arriving at Mulba. After leaving Leh, he travelled through the Shyok and Nubra valleys and on to the Siachen glacier. The latter is a totally uninhabited region, a factor which materially increases the difficulties of transport. Dainelli's great experience stood him in good stead and he achieved his object where others less experienced would have failed. He established a base about halfway up the Siachen glacier, and made excursions up the glacier and along its chief affluents. After a stay of about two months he started to ascend the Teram Shehr glacier and discovered a pass leading down on to the Rimo glacier, which he appropriately called the Colle Italia. Dainelli then returned to Leh by way of the Nubra valley and Khardung La and thence over the high Rupshu passes to Sultanpur, in India. The author's journey thus cleared up one of the few remaining mysteries of the Karakoram.

The photographs are excellent, especially those showing snouts of glaciers, which should prove very useful in the compilation of records relating to the movements of glaciers. The book with its 400 pages and photographs is surely worthy of a sketch-map. In spite of his knowledge of this part of the world the reviewer has found it difficult to follow the route taken, and many readers would be completely fogged; this is a most regrettable lapse. There is also no index, which makes the book difficult to use for reference purposes, though in all other respects it is well produced. Space will not permit of reference to the results achieved, though we hope that an English publisher will let us have the scientific results of Dainelli's journey of 1930. B. K. F.

AFRICA

THE TRIBES OF THE ASHANTI HINTERLAND. By Captain R. S. RATTRAY. With a chapter by D. WESTERMANN. *Oxford: Clarendon Press* 1932. Two volumes. 9×6 *inches*. Vol. I, xxxii+292 *pages;* vol. II, xii+293–604 *pages; illustrations and map*. 45*s*

These two volumes by Captain Rattray conclude the series of reports issued for the Anthropological Department of the Gold Coast Government. The previous volumes, 'Ashanti' (1923), 'Religion and Art in Ashanti' (1927), 'Ashanti Law and Constitution' (1929), 'Akan-Ashanti Folk-Tales' (1930), which appeared from the same press, together with the work under review, present a very complete general survey of the lay and religious customs of the peoples dwelling in the hinterland of the Gold Coast Colony, and are the result of ten years' intensive research by the author.

The absence of maps renders the works difficult for the ordinary reader to follow. In the first report there is a sketch-map of Ashanti, so sketchy that it could almost have been omitted, and in the present volumes there is a rough tribal and linguistic map of the Gold Coast Colony, which covers the Colony of Ashanti, the Protectorate of the Northern Territories, and the Mandated Territory of Togoland. Unfortunately this little map presents many inaccuracies even in the spheres for which it was designed. To quote a single instance, Captain Rattray in his preface refers to the Vagala people, but their name does not appear on the map, although their language does. Moreover he states: "This name does not even appear on our maps or in any official publication." The author is apparently unaware of the late George Ekem Ferguson's map of the Northern Territories (scale 1 : 506,800) published by the Ordnance Survey Office, Southampton, in 1897. The inaccuracies in the map issued with the present

volumes are also the more to be regretted as the author had at his disposal the excellent resources of the Gold Coast Government Survey Department, and a map could have been produced not only of extreme accuracy but of artistic appearance, which this is certainly not. At the same time it might have been expected that the orthography of the place-names would have been in accord with the list of names published for this Society by the P.C.G.N. and approved by the Gold Coast Government.

A certain amount of carelessness in the preparation of this work, which from its nature should have been prepared with the most meticulous care, is apparent throughout. For instance, on p. 129 in a short bibliography of works dealing with the language of the country, M. Froger's name is spelt Frogen and Mossi Massi, while the name of the little work by Mr. Simeon Okraku is omitted, the author's name being followed by a blank space. This last is inexcusable, since his 'Dagomba Grammar' was issued from the same press as Captain Rattray's work. The index contains many errors, footnotes frequently refer to wrong pages, and such obvious slips occur as that shown by a comparison of pp. 171 and 236, where *sebega* is translated in one case by "roan," in the other by "hartebeest." It is unfortunate that the native words should appear in the new alphabet which the International Institute of African Language and Culture has advised should be adopted. To the ordinary reader that alphabet is unintelligible and its use detracts from the value of the books. Captain Rattray has perhaps throughout this study made an inordinate use of native terms: the continued use of italics and brackets makes tiresome reading.

The first 129 pages are devoted to linguistics and include some notes thereon by Professor D. Westermann. Captain Rattray's statement on p. viii ("the majority of the population which inhabit this territory were found to speak a language which has a common root or basis") is scarcely original, and the importance he attaches to it, here and at the foot of p. ix, seems excessive. Probably the earliest reliable printed work which deals to any considerable extent with the Protectorate of the Northern Territories is Binger's 'Du Niger au Golfe de Guinée,' in vol. 2 of which the intimate relationship between the language of the Protectorate, Dagomba, Mamprusi, etc., and that spoken by the Moshi is commented on at considerable length. That was in 1893, and every writer on the language of those parts has drawn attention to this fact, *e.g.* Delafosse, in his '60 Langues parlées à la Côte d'Ivoire et dans les régions limitrophes' (1904), Tauxier in his 'Le Noir du Soudan' (1912), Westermann in his 'Die westlichen Sudansprechen' (1927), and others of lesser importance. The only references to previous authors to be found in the index are to Cardinall, Cramer (inaccuracy for Cremer), Froger, Mary Kingsley, Okraku, and Westermann—rather a poor list, even taking into account the fact that all but the first are references made in connection with linguistics. There does not appear to be any addition to the previous knowledge amassed by the studies of Messrs. Delafosse, Tauxier, Froger, Funke, Fisch, Cremer, and Westermann.

Of the remaining 457 pages over 200 are devoted to the Nankanse, a tribe numbered in 1921 at 82,395, considerably less than one-sixth of the population in the Protectorate of the Northern Territories, and a little more than one-eighth of the total population of the country covered by this report as returned in the census of that year. This disproportion the author excuses to a certain extent by once again drawing attention to the similarity in culture of all the peoples in the area he surveys, but he would certainly have attained that object better by a closer study of a tribe not hitherto described in detail. Moreover by informing himself beforehand of what so many writers have already narrated, often in the closest detail, he would have spared himself from "not knowing with any cer-

tainty beforehand that each tribe and area would not represent a new language and a new culture." There is no reference in the index to the anthropological studies of Tauxier, Delafosse, Mangin, Klose, Funke, Labouret, or Joseph.

The illustrations are excellent, and the volumes, completing a decade of anthropological research, form a record of the life and customs of the peoples dwelling in the Gold Coast Hinterland at the present day. They contribute little to what was previously known, but they do succeed in placing under one cover almost the sum total of our knowledge. Qualification is certainly necessary as any one must perceive who is at all familiar with the works of the French and German authors who have covered so well practically the whole of the southern portion of the Western Sudanese zone, in which is included that area which forms the subject-matter of Captain Rattray's latest work. A. W. C.

CATTLE FARMING IN SOUTH AFRICA. By A. M. Bosman. (South African Agricultural Series. Vol. 10.) *South Africa [Johannesburg]: Central News Agency* 1932. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 458 *pages; illustrations and maps.* 27*s* 6*d*

This is a valuable book of reference and advice from an expert for any one who is dealing with the practical side of cattle farming in South Africa. Throughout there is constant reference to the main geographical factor affecting production in South Africa, its rainfall, so often unreliable and scanty. Its seasonal distribution is such that over large areas the maximum rainfall coincides with the highest temperatures, so that much is lost through evaporation. Pasture is therefore more important in most parts than agriculture, but the pastures need improving and the stock that grazes them needs improving. At present South Africa does not rank high in the world's markets for either beef or dairy produce. Professor Bosman discusses in detail the breeding, rearing, feeding, and management of cattle and the marketing of their produce in such a way as to raise the standard of production throughout the Union. It is highly desirable that farmers in South Africa should profit by the sound advice given in this book, which is however badly bound for a book of its price, while some of the maps and diagrams have been so much reduced as to be useless. A. B.

BAMBUTI: die Zwerge vom Kongo. By Paul Schebesta. *Leipzig: F. A. Brockhaus* 1932. $9\frac{1}{2} \times 6$ *inches;* 270 *pages; illustrations and sketch-maps. M.*11.50 (*Unbound M.*9.75)

Father Schebesta has followed up his study of the pygmies of Malay and Sumatra by an investigation into those of the Belgian Congo, undertaken on an expedition lasting from January 1929 to August 1930. This volume should therefore be a work of the greatest importance, but the reader soon realizes that Father Schebesta has not included all his results, also that though the book contains much new material it is not always well arranged. Moreover it is printed in gothic characters. For these reasons all except specialists may prefer to consult the excellent summary (printed in Latin characters) provided by Father Schebesta for the *Ethnologischer Anzeiger* (Vol. III, pp. 41–49). In the following account both sources are drawn upon.

The main body of the African pygmies are found on the upper Ituri and its neighbouring streams, with isolated groups on the upper Lomami and around Lusambo. Groups of apparently true pygmies are also found in the Cameroons and Gaboon. All other so-called pygmies, such as the Batwa of Tanganyika and Ruanda and the Bacwa north of Lake Leopold II, Father Schebesta considers to be "Pygmoids" of mixed blood. The author disapproves of the term Negrillo, on account of the skin colour of the pure members of the race, indeed he states that the Negroes considered the pygmies to have as light a skin as the white man, and often referred to them as his "brothers." Father Schebesta estimates the

number of pure pygmies in the Ituri forests at twenty thousand. He distinguishes three groups, according to language: Efe, Bambuti, and Aka. To the much-debated question whether the pygmies have a language of their own, he answers that Efe is the true language of the race; the old belief that every pygmy group speaks the language of its patron tribe as well as its own is however true, and is due to prolonged contact, some groups actually speaking as many as five languages. The average stature arrived at from examination of 295 males was 144 cm. (about 56½ inches), and that of 180 women 133 cm. (about 52¼ inches). There is however a wide variation according to group. One woman was under 120 cm., and only 28 men were over 150 cm. The pygmies are said to be totemic. Their settlements consist of extended families (*Sippe*) or several of these. Within this group exogamy is strict; there is also a "clan" exogamy, not so strictly observed. There is a rather casual worship of a god, with offerings of game and jungle produce; ancestor worship is said to be almost absent.

The book is illustrated with many excellent photographs, and all will join in congratulating Father Schebesta on his success in making friends with these shy jungle folk and on the results he has obtained. C. G. S.

LES TRIBUS DU RAMEAU LOBI. By HENRI LABOURET. (Trav. et Mém. Inst. d'Ethnologie. XV.) *Paris: Institut d'Ethnologie* 1931. 10½×7 *inches;* viii+510+xxxi *pages; illustrations and sketch-maps.* 125 *f*

Professor Henri Labouret has placed ethnologists under an obligation through the publication of this admirable memoir dealing in a very thorough manner with the tribes of the Lobi group, who inhabit the Upper Volta region, an area extending westward from the Black Volta River, and to the north of the Ivory Coast of West Africa. Hitherto these tribes have received little attention, and the present work is the first attempt to describe them in ethnological detail. The attempt is very successful, and has resulted in a monograph which may well serve as a model for other descriptive works dealing with local native groups. As a work of reference it will be easy to use, as it is very clearly written and the material is well and conveniently arranged. The whole gives a detailed picture of the general life and culture-status of these natives. The arts and industries are more fully dealt with than is usual, and this is very welcome, since it affords valuable concrete material of considerable importance for tracing culture affinities. Social structure, domestic economy, administration, and beliefs are all described as fully as possible, testifying to the energy with which Professor Labouret pursued his researches in the field, and to the confidence which he must have won before he could overcome the reserve of these rather shy natives. That he should have succeeded speaks well for his sympathetic handling of them. Although this work is primarily ethnographical, it also claims the geographer's interest when it serves as a basis for ethnological study, for the detailed description of a local group of tribes is of great value for comparative study. The links which can be traced with other tribes, often far distant, involve consideration of probable migration routes in the dispersal of peoples and of culture items, and also consideration of the extent to which similarity in culture is due to similarity in environment. The author does not enter deeply into these wider issues, being content to offer reliable material from a single area, but he has in view the importance of comparative application of his monographic contribution, and draws attention to certain notable correspondences with tribes as far to the east as the Bauchi Plateau of Nigeria, and many seeming affinities with even more remote tribes could easily be suggested from the information brought together in this volume. The illustrations are very numerous and, for the most part, adequate, although some have been too greatly reduced. H. B.

NORTH AMERICA

ALPINE ZONE OF MOUNT WASHINGTON RANGE. By ERNST ANTEVS. *Auburn (Me.): Merrill and Webber Co.* 1932. 7½×5 *inches;* viii+118 *pages; illustrations*

Originally one of that renowned band of glacial geologists trained by Baron De Geer, of Sweden, the author of this excellent book has become well known in recent years for his work and writings on the phenomena of the retreat of the last Pleistocene ice-sheet of North America. His studies have covered a large area in eastern Canada and the New England States, and they have been marked by great precision and attention to detail in these lowland districts. Dr. Antevs has now turned his attention to the elevated districts of the White Mountains, New Hampshire, of which Mount Washington forms the culminating point, and he compares the conditions thereon with those prevailing on Mount Katahdin in Maine, and other mountains of the North-eastern States.

Much controversy in the past has ranged round the question of the thickness of the last ice-sheet, and as to whether it was sufficient to submerge such summits as Washington (6284 feet), Katahdin (5267 feet), and the highest points (Mount Marcy 5344 feet) of the Adirondack Mountains in northern New York State. By a careful re-examination of the Presidential Range of the White Mountains—it has already been studied by a number of experienced observers in the past—the author confirms the existence of glacial striae, roches moutonnées, and perched blocks, up to elevations of 5000 to 5300 feet. Moreover in the absence of any indication of an upper limit of glacial action and the presence of fresh erratics on the summits, there seems clear proof that the entire White Mountains were covered by the last continental ice-sheet. Since the surrounding land stands at an elevation of about 1000 feet, the ice in the region must have been at least 5000 feet thick. Similar evidence is adduced for Katahdin, and it is plausibly reasoned that if these ranges were submerged, then the highest peaks of the Adirondacks, at no greater distance in general from the centre of dispersal in the north, must have been completely engulfed.

Such authorities as Professor A. P. Coleman have maintained that the amount of frost-riven material, and other effects of weathering, on the Adirondacks and other summits of north-eastern America, implies that they were not buried by the ice; that such material would have been swept away if the ice-sheet had passed over these mountains. This question Dr. Antevs examines in great detail, and in Chapter IV the whole matter of ground-frost and frost action in their many phases, as well as of solifluction, is dealt with very fully. He shows that, considering the potency of the frost processes and the long period of their operation (some twenty-five thousand years) since the first status of these summits as nunataks above the waning ice-sheet, there has been ample opportunity for the production of a moderately thick covering of frost-riven debris. The reviewer would like to endorse this view from observations in these and comparable regions of the sub-Arctic and Arctic, and to sound a warning against the hasty acceptance of the presence or absence of weathered surfaces and soils as final criteria of earlier or later glaciation respectively. In an excellent chapter the author examines the oft-debated question of the date of formation of the glacial cirques, of which both the White Mountains and Katahdin display such notable examples, and their mainly pre-Wisconsin age is clearly demonstrated.

A chapter on climate shows what a veritable outlier of the Arctic regions Mount Washington is: the mean annual temperature being 15° F., while minima of less than −50° F. have been recorded. During the winter of 1870–71 the temperature fell to −59° F. with a wind-velocity of 100 miles per hour. The mountain is said

to hold the wind-velocity record with 182 miles per hour, recorded on 1 April 1879. The present writer has vivid recollections, after a winter ascent of the mountain, of gladly taking shelter for the night in the summit-refuge during one of the sudden storms, accompanied by a blizzard, for which Mount Washington is notorious, and has indeed at times exacted its toll of human life.

The very full treatment of this most interesting and beautiful region is completed with chapters on the flora, vegetation, and fauna, and a comprehensive bibliography is added. The only mistakes noted are of a minor character in the Introduction, where the statement that the Torngat Mountains of northern Labrador probably attain 7000 feet should be corrected to 5000 feet; moreover the long-standing claim of Mount Mitchell (6711 feet) in North Carolina, repeated here, to be the highest summit of eastern North America has now passed, it is understood, to Mount Guyot (7025 feet) in Tennessee. N. E. O.

THE ISLE OF AUKS. By NICHOLAS POLUNIN. *London: Edward Arnold & Co.* 1932. 9×5½ *inches; 254 pages; illustrations and sketch-maps.* 10*s* 6*d*

Mr. Polunin was a member of the 1931 Oxford University Expedition to Akpatok Island, which lies in Ungava Bay on the southern side of the Hudson Strait, and in 'The Isle of Auks' (which is the literal translation of the Eskimo word Akpatok) he gives a personal account of his work and adventures on the expedition. The same lack of restraint, which has on more occasions than one led the author's footsteps into unnecessary danger, hovers round his writing. His account, in the first chapter, of St. John's, Newfoundland, is in questionable taste, particularly in view of the privileges which the Newfoundland Government accorded the expedition, and some one with a little more sense of responsibility towards the name of his expedition would have taken greater care not to offend the susceptibilities of the people.

We cannot but suppose that some of his northern friends have gently pulled the author's leg about the dangers of polar bears: "Nevertheless," he writes, "the Huskies [Eskimos] and all the world are more afraid of them than of anything else, and often run into the settlement dithering and shaking and saying they have seen a bear." This statement, a travesty of the Eskimo's attitude towards "Nanook," is hardly compatible with the fact that during their stay on Akpatok Island, which is infested with polar bears, the author and other members of the expedition frequently travelled at close quarters with bears without carrying weapons of any kind. Only on very rare occasions have bears been known to attack human beings.

When Mr. Polunin is dealing with the story of the expedition, and not with hearsay, he writes graphically and vigorously and makes full use of his descriptive talent, and one gains from the book a closer insight into the scope and spirit of a University expedition than could be obtained from a more orthodox account. There is no reserve, and the expedition being of brief duration the reader is treated to an almost preraphaelite picture of Mr. Polunin's botanical, social, and culinary activities on Akpatok Island. The expedition was successful both in mapping the island and in gathering much scientific data regarding the flora and fauna, but 'The Isle of Auks,' being more or less a transcription of the author's private diary, can be regarded in no sense as an authoritative account. The last chapter but one deals with the tragic loss of Mr. Christopher D'Aeth, who played a large part in organizing the expedition and who was accompanied by the author on the journey on which the fatality occurred. The story of their misfortunes and their struggle to reach camp is described at length; and if it had to be written in such painful detail, its sole justification lies in the hope that its lesson will be taken to heart by the members of any expedition whose enthusiasm outstrips their experience in travel.

It is permissible to doubt whether the best interests of the expedition have been served by so ingenuous a volume, whether the susceptibilities of its members have been respected, or lastly whether the author was justified, all things being considered, in offering his diary for publication.

The book contains two sketch-maps and is adequately illustrated, but lacks an index. G. B.

CENTRAL AND SOUTH AMERICA

FALL OF THE INCA EMPIRE: and the Spanish Rule in Peru, 1530–1780. By PHILIP AINSWORTH MEANS. *New York; London: Charles Scribner's Sons* 1932. 9½×6½ *inches;* xii+352 *pages; illustrations and facsimile map.* 21*s*

The story covered by the first portion of this title is fairly well known to the general reader; it is the description of the Spanish colonial system which is welcome, for this period has not received detailed treatment in works in English. Mr. Means appears to have a wide acquaintance with the literature of his subject, but has wisely collected his notes at the end of the chapters, so that the general reader can glean the main themes rapidly from his text.

Spain was the first European Power to be faced with the administration of a vast empire, and sought the solution in rigid absolutism. The writer brings out well the defects in this method, to which the great distances between the ultimate seat of power and the dominion contributed, and especially its effect upon the Indian peoples and economic development. His severe attitude towards Las Casas, who advocated the other point of view—that the Indies should be held in trust for their inhabitants—is puzzling. His own book is surely evidence of the truth of Las Casas's charges. But such an administrative ideal was beyond the practice of an age bitten with the lust for precious metals, though it undoubtedly influenced some of the Spanish measures. The author however adopts in general a broad tolerant outlook, reserving his strongest disapproval for the deeds of the Elizabethan seamen and Lord Anson.

G. R. C.

AUSTRALASIA AND PACIFIC

THE PROBLEM OF LEMURIA, the sunken continent of the Pacific. By LEWIS SPENCE. *London: Rider & Co.* 1932. 9×5½ *inches;* 250 *pages; illustrations and maps.* 10*s* 6*d*

Mr. Lewis Spence, who is well known for his writings on Atlantis, has now tackled the problem of Lemuria. He admits that the former existence of a sunken Pacific continent must remain a theory until such time as final and adequate proof is forthcoming, but while he himself believes that Lemuria not only existed but was inhabited, he is content to place before his readers with moderation and commendable impartiality such evidence as he has been able to collect and such arguments as appear to justify his case. He examines in turn the evidence offered by archaeology, by tradition, myth, and custom, by Pacific art, by geology and biology. Having presented his case he proceeds to draw his own conclusions. He does not rely on either biological or geological evidence because he finds it is too contradictory; that it is so is true up to a point—one school of thought accepts the permanence of the Pacific, while the other believes in repeated changes, but even though those changes occurred later than in other oceans, the crux of the matter seems to be that such land-masses, if they did exist, existed in geological time and before the appearance of man upon the Earth, whereas it is part of Mr. Spence's case that Lemuria (divided into several sub-continents or large archipelagoes) was inhabited, and governed by a fair race, whose culture

was that of the late Stone Age and "who were remarkable chiefly for their arcane knowledge and their prowess as builders." Dismissing geological evidence, therefore, and relying mainly on archaeological and traditional considerations, his conclusion is that the chief land areas were: a great continent stretching from the Sandwich group to and including New Zealand, another stretching from New Caledonia and Sumatra, and a third in the vicinity of Easter Island; this he considers to have been the original home of his cultured white race and to have remained longer than any of the other land-masses above water, part of it having indeed been that land sighted by Davis in 1687!

Even those many who cannot accept Mr. Spence's conclusions may find his book of interest. A great deal of serious research has gone to the making of it, and he marshals his evidence so succinctly as to be readily intelligible to the layman. This being so, it is the greater pity that he has not paid more attention to the documentation; the book contains no bibliography, which would have been immensely useful to the student, and while he quotes extensively from the work of others he rarely troubles to give the titles of their books, much less the exact reference. For example, he makes continual mention of Professor Macmillan Brown's observations and theories, but not until p. 76 does he mention his well-known book on the Pacific, and then by a wrong title. O. R.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

WHALES AND MODERN WHALING. By JAMES TRAVIS JENKINS. *London: H. F. and G. Witherby* 1932. 9 × 5½ *inches; 240 pages; illustrations.* 12*s* 6*d*

There have been many books on whaling in recent years, but few on the natural history of whales. For a full account of all species it is necessary to go back to relatively old books unless use is made of scattered papers. Dr. Jenkins in this volume deals at length with the biology of whales, north and south, and particularly of those species which are hunted. He has made full use of the many recent papers which are the outcome of revived interest in whaling. The result of this revival of whaling is that the species of modern pursuit, that is to say in a general way the "finner" whales, appear to be much better known than the species whose pursuit has almost ceased, like the Greenland whale, the sperm whale, and the white whale. Dr. Jenkins discards the Bescay whale as a distinct species from the southern right whale or nordcaper, and considers the American bowhead to be the same as the Greenland right whale. He seems a little undecided about the specific name of the lesser rorqual, but he gives a very clear account of the characters of all the important whales. He has collected many statistics relating to the slaughter of whales and shows how various species are doomed to virtual extinction unless international action be taken without further delay. From 1919 the world total of whales taken has risen from about 11,000 almost steadily to over 40,000 in 1931. Of these totals perhaps two-thirds came from the Southern Ocean. Whales attain maturity young, but are slow breeders. One calf in two years means a slow increase, and there is an appalling record of the slaughter of pregnant females and immature whales, and the percentage of sexually mature female Blue whales captured shows a steady decline. Dr. Jenkins's avowed object in this book is to draw attention to the urgency of restriction. Opinion seems to be moving, though slowly, in that direction. Norway, who controls so much of modern whaling, has drawn up regulations that are now in force, and the United States is taking action. A few years ago Great Britain gave an evasive answer to a move on the part of the League of Nations to formulate restrictive measures. But wiser counsels are

now prevailing. Meanwhile excessive killing causes glutted oil markets, and so the pace slackens from time to time. There are illustrations of many of the species of whales and a fairly complete bibliography of books on whales and whaling since 1921. The book forms a useful sequel to Dr. Jenkins's earlier volume, 'A History of the Whale Fisheries.' R. N. R. B.

ECONOMIC AND HISTORICAL GEOGRAPHY

THE VISIT OF THE *RURIK* TO SAN FRANCISCO IN 1816. By AUGUST C. MAHR. (Stanford University Publications—History, Economics, and Political Science. Vol. II, No. 2.) *Stanford (California): University Press; London: Humphrey Milford* 1932. 10×6½ *inches; 194 pages; illustrations.* 11*s* 6*d*

In the eighteenth century Russian expeditions accomplished a considerable amount of exploration in the Pacific. Russian fur traders were not slow to follow in the wake of Bering, and to push their way southwards along the American coast, and in 1813 they actually established a post at Bodega Bay not far north of San Francisco. The most important of the later Russian geographical expeditions was that of Captain von Krusenstern, who made a voyage round the world in the years between 1803 and 1806. With Krusenstern's help, Count Rumyantsov, who had resigned the office of Chancellor of the Russian Empire in 1814, made plans for another Russian expedition into the North Pacific Ocean. Otto von Kotzebue was chosen as commander of the expedition, which was to sail in a two-masted brig of 180 tons, called the *Rurik*. The vessel left Kronstadt in July 1815, and returned in August 1818.

The ostensible objects of Kotzebue's expedition were to explore certain parts of the South Sea and to investigate the possibility of a passage from Bering Strait to the Atlantic, in other words, to discover the north-east passage. The latter object was not achieved, and the *Quarterly Review* for January 1822 severely criticized Kotzebue for abandoning his efforts in search of a passage. The scientific side of the expedition was in charge of Adelbert von Chamisso, a member of a French emigré family, which had taken refuge in Berlin. Chamisso's botanical work, made on this expedition, was of considerable value. Chamisso's general account of the expedition was fuller than that made by Kotzebue, whose report was hampered by political considerations, and it is Chamisso's report which indicates that Professor Mahr is right in believing that the object of the expedition was "not so much scientific as political," and "that the investigation of a North-east Passage may have been a sham." Mahr thinks that the object was "to investigate how much power of resistance there was left in the dying organism of the Spanish colonial empire." He considers that the visit of the *Rurik* to San Francisco between 2 October and 1 November 1816 was the most important event of the expedition, as "San Francisco was the strategic point where the southward expansion of Russian imperialism on the Pacific coast collided with the legally established, though stagnant colonization of the Spaniards."

In this volume Professor Mahr has brought together all the documentary material which describes the visit of the *Rurik* to San Francisco, and made it into what he calls "a collective travel-diary." He has included the documents in which the Spanish hosts described their foreign guests, and a catalogue of the scientific results achieved by the naturalists of the expedition, when in the San Francisco region. English translations of all documents written in German, French, Spanish, and Latin are contained side by side with the originals. The documents as a whole produce an interesting picture of San Francisco in the

early years of the nineteenth century and reveal the extraordinary weakness of the Spanish military forces. It is amusing to read of "the Chilean sentinel fallen asleep on the doorstep of his colonel, and the colonel carefully leading his guest over the sleeping soldier in order not to disturb his slumber," and "the broken halyard on the Presidio of San Francisco which had to be repaired by a sailor borrowed from the *Rurik*, because none of the Spanish sailors could climb the flag-staff." In addition to the documents, the book contains a valuable introduction, a bibliography, an index, and some interesting illustrations. E. W. G.

GENERAL

MÉLANGES GÉOGRAPHIQUES, offerts par ses élèves à Raoul Blanchard à l'occasion du vingt-cinquième anniversaire de l'Institut de Géographie Alpine de Grenoble. *Grenoble: Institut de Géographie Alpine* 1932. 10×6½ *inches; 670 pages; illustrations and maps*

This is a series of essays presented by his students to M. Raoul Blanchard, Professor of Geography at the Universities of Grenoble and Harvard, and Director of the Institute of Alpine Geography. The volume is prefaced by a portrait of M. Blanchard and a list of no less than a hundred and eighty works of which he is the author.

The majority of the studies collected in this volume deal with geographical regions or activities in France. Of these, naturally and fittingly, about half are concerned with the French Alps: transhumance, types of dwelling, emigration, the ancient trade in cloth between France and Savoy, etc. But the other mountainous regions—the Central Massif, the Jura, and the Pyrenees—are also well represented, having a dozen treatises devoted to them. Apart from French studies, we are given a sketch of the historical geography of Warsaw, an account of a recent development in the settlement on the line of demarcation between desert and oasis to the north-east of Damascus, where desert nomads, being without resources owing to the loss of their sheep and finding under the present régime difficulties in recouping themselves by raiding, have settled down to work as labourers for the fellahin. Finally we have a couple of American studies by Americans: one on Miami and south-east Florida, and one on American contributions to mountain climatology.

It is impossible to review in detail this motley collection. Suffice it to say that they make a most readable geographical "omnibus." Although most of the contributions are slight, each gives evidence of personal investigation, and indeed many of the writers are familiar to us as having already published major pieces of research of recognized merit. One need mention only M. Faucher, M. Gibert, and M. Arbos.

The book is illustrated by a number of excellent photographs: those of the Everglades, in Miss Bingham's Miami essay; those of the Ariège glacier by M. Faucher; or those by which M. Benevent illustrates his morphological study of the blind valleys that notch the edge of the Central Jura above the Vignoble. The reader, if his sight is good, will find the rough sketch-maps and plans that accompany the essays an additional help. H. O.

THE MONTHLY RECORD

MANCHUKUO AND ITS NEW CAPITAL

We are informed by the Foreign Office that the Bureau of Information and Publicity of the Department of Foreign Affairs in Manchuria has issued a bulletin stating that the correct forms of the new state and of its new capital are respectively Manchoukuo and Hsinking; it has been decided however to use in the Foreign Office the form Manchukuo, not Manchoukuo. Hsinking, which means "new capital," is the new name of Changchun, and the form appears to be a hybrid; the spelling would be Hsinching by the Wade system and Sinking according to the general usage of the official Chinese "List of Post Offices."

SOUTH AFRICAN RAINFALL

Professor F. E. Plummer, who a few years ago investigated the rainfall of the Transvaal in relation to farming (*Geogr. J.*, vol. 71, p. 312), has recently produced a treatise under the auspices of the University of Pretoria entitled 'Aspects of Rainfall in the Western Cape Province: a Basis for Geographical and Agricultural Study,' which he intends to follow up with a similar account of the Eastern Cape Province (*Bull. Univ. Pretoria*, Ser. No. I, 22, 1932). Neither the physical features nor geographical position of the Province are favourable to regular or abundant rainfall, and the only well-watered regions with more than 30 inches of annual rainfall are south of 32° S. within 70 miles of the coast, where some of the mountains, including Table Mountain, are foci of heavy rainfall with upwards of 100 inches. The Great Escarpment, on the contrary, which reaches 8500 feet in the Compass Berg, only receives a little over 10 inches, and more than 60 per cent. of the province has less than 10. On the desert north-west coast there are considerable tracts with less than 5 inches, though here we have the paradox that the air, under the influence of the cold Benguella current, is very damp and foggy. The important feature of Professor Plummer's paper is a discussion in detail of the monthly distribution and annual variability of rainfall in relation to local geographical features of a number of subdivisions of three main seasonal types, a Western type with winter rains, an Interior type with summer rains, and a Southern type, found adjacent to the warm Agulhas current with an even seasonal distribution. Both the Western and Interior divisions, especially the former, combine great uniformity in the regimen with great irregularity in the amount of rain from place to place and from year to year. The Western area in fact contains both the wettest and driest spots not only in the Western Province but also in the whole of the Union. In the Cape Peninsula there are extraordinary variations in the average rainfall within very short distances, on account of relief, irregular air currents, and proximity to cold Atlantic water and the warm water in False Bay. Cape Town's average rainfall of 25 inches, about the same as London's, is shown to compare not unfavourably with the latter as regards reliability. The Western type at the Cape is favourable to cereals and fruit because the rains come in the cool season when evaporation is small.

Professor Plummer points out that modern commercial competition between producers in different regions makes the production of a crop or animal commodity sensitive even to the minute climatic advantages or disadvantages which a district may possess, and calls for still more extended researches into the peculiarities of South African rainfall. Whilst agreeing that fresh facts and relationships should always be sought we think it should be understood that attempts to reach finality in the quest for "standard normals" or "true average values" of rainfall, either in South Africa or elsewhere, are likely to prove futile

because evidence is accumulating that such quantities are not stable in any part of the world.

EARLY ITALIAN KNOWLEDGE OF ABYSSINIA

Dr. Laura Mannoni, whose account of an early map of Ethiopia was referred to in the *Journal* for July 1932 (p. 92), has another interesting study in the *Bolletino* of the Italian Geographical Society, vol. 9, nos. 9–10, 1932, on a collection of MS. itineraries in the same region preserved in the National Library at Florence. Although the MS. has been attributed to Strozzi, of Florence, there is now no doubt that it was written by Alessandro Zorzi, of Venice, who is known to have travelled in Greece and Egypt for antiquarian research in the late fifteenth century. Early in the next century Venice was visited by various Franciscan friars, natives of Ethiopia, who were interviewed by Zorzi and gave him many particulars about the country and its productions which he jotted down as he received them. They include detailed itineraries through various parts of the country (sometimes wrongly attributed to Fra Nicolo da Oliveto) in which mention is made not only of the principal towns, but of a large number of villages on the routes followed, and many of the rivers are given under names still to be recognized. Among the most interesting itineraries are those of Fra Raffaelo and Fra Tomaso, the latter of whom described to Zorzi, in 1523, his journey from Barara (the chief town in Shoa) to Jerusalem, giving particulars of many of the Abyssinian provinces, the flora and fauna, and customs of the people: his account of Lake Haik on the eastern border of the plateau is very accurate. Besides the Hawash and two branches of the Nile he mentions another large river said to be called Ubi, and though he puts its source in the remote south it would seem possibly to represent the Webi Shebeli. The only mountain actually named is Gafat. An interesting item is the mention of a Venetian painter, Gregorio Becini, then settled in Abyssinia, not otherwise known. Tomaso refers to the Portuguese trade with Abyssinia and speaks in glowing terms of Axum and its buildings, including its obelisks. Speaking generally the north is well known, and farther south the region traversed by the main caravan route to Shoa, while the sea-coasts are less known, though Suakin, Massaua, Arqiko, Zeila, and Berbera are mentioned. The information is an important supplement to that given by the Portuguese writer Alvarez, but does not appear to have been used by the Italian map-makers of the sixteenth century.

INTRODUCTION OF REINDEER INTO CANADA

A herd of 3000 reindeer are now far advanced on their route from Alaska to Canada, and it is expected that these will form the nucleus of an abundant food supply and extensive industry for the Eskimo of the North-west Territories.

There have been other attempts to introduce reindeer into Canada, but these were made without sufficient investigation and were not successful. This time the Canadian Government has had the advantage of the experience gained in Alaska, and has also made long and thorough examination of the conditions and prospects in Canada. To supplement and confirm the data already secured the Government engaged the Porsild brothers, Danes born and bred in Greenland and trained biologists and botanists, to investigate conditions in both Alaska and Canada; Messrs. Porsild began the work in 1926, spent two years and covered nearly 15,000 miles in continuous travel and study of the conditions over the area, and reported to the Department of the Interior that the grazing grounds of the North-west Territories were in many respects superior to those of Alaska. Messrs. Porsild advised that a start should be made with a herd of 3000 reindeer and that they should be established on the Kittigazuit Peninsula in the District

of Mackenzie, about 40 miles east of the Mackenzie River, an area which contains grazing grounds of 15,000 square miles capable of supporting 250,000 reindeer; this location was decided on, and three families of Laplanders brought from Lapland about a year ago to prepare for the arrival of the herd. A reindeer herd will, under favourable conditions, double in three years, and as the original herd increases new herds can be established in other areas. Investigations have shown that there are further suitable grazing-grounds north and east of Great Bear Lake, at Clinton-Colden Lake on the north-east corner of the Thelon Game Sanctuary, and near Baker Lake on the western extremity of Chesterfield Inlet and on the west coast of Hudson Bay, so that the available areas stretch across the North-west Territories from west to east.

The selection and purchase of the herd to be brought to Canada was completed in December 1929 under the superintendence of Mr. A. E. Porsild. The herd as chosen consisted of 2890 does and 305 bucks, there being a surplus over the required 3000 to allow for losses on the way, but there would also of course be births on the route. In addition to these does and bucks there were also purchased for transportation purposes 247 steers. The contract is for the delivery of the herd on the west bank of the Mackenzie River.

The drive, under the direction of the firm from whom the reindeer were purchased, was planned to begin early in October 1929 from Buckland Point on Kotzebue Sound in western Alaska and to reach the west bank of the Mackenzie River about March 1931, or in about a year and a half. It did not actually start till 16 December 1929, and was reported in August 1932 to be between the Canning and Sadlerochit rivers in Alaska, about 250 miles from its destination, so that the actual period will be well over three years. The difficulties of such a drive, even under the most expert handling, through a wild and practically unknown district and including the crossing of a mountain range, all far within the Arctic Circle, are not difficult to visualize.

Young animals were chosen so that they would not be under as great an urge as older ones to return to their former feeding grounds. These young animals proved intractable, and further time was lost on the drive in breaking in the young steers to the sled work, as it was necessary to use the trained animals to lead the drive and coax along the others. Every April a long halt extending into the summer has to be made to allow of fawning and for the fawns to gain strength for the journey. No plans of the route taken or detailed reports have yet been received, and while the distance has been stated as 1000 miles this appears to be the air measurement and the actual route miles to be considerably more. When the reindeer reach the west bank of the Mackenzie River they can only cross on the ice, and there appears little prospect of their doing so and reaching their allotted feeding-grounds on the Kittigazuit Peninsula till well on in 1933.

H. E. M. K.

SOIL EROSION IN THE UNITED STATES

An illustrated article by Mr. H. H. Bennett, in *Sci. Mon.* for November 1932, describes the pernicious effects of a wasteful system of agriculture in causing excessive soil erosion on cultivated slopes in many parts of the United States. He distinguishes between ordinary soil erosion and the abnormal erosion due to human activity which is bringing about deterioration in the value of agricultural land as well as changing the character of the vegetation of affected slopes. Over extensive tracts of country the productive top-soil charged with humus has been removed by drainage, causing land formerly under tillage to become derelict and colonized by worthless types of vegetation in place of the valuable timber that grew there before the land was tilled. Thus in Oklahoma a survey completed in 1930 showed that of roughly 16,000,000 acres under cultivation, 13,000,000 were

subject to excessive washing, and nearly 6,000,000 were too deeply gullied to be worked by the plough. In the grazing country of the semi-arid South-Western States erosion following over-grazing has led to the severe denudation of enormous areas of upland, changing the character of the herbage to the impoverishment of the pasture. A case is cited of a rainfall on 10 May 1930, which in the Black Soil Belt of Texas removed 23 tons of soil per acre on a 4-per-cent. slope.

The author maintains that though erosion cannot be completely controlled it can be effectively checked, and considers that measures for determining the most effective and economic way of conserving soil and water on sloping surfaces should be made the subject of scientific research.

THE MAP OF THE ANTARCTIC REGIONS COMPILED BY THE NATIONAL GEOGRAPHIC SOCIETY

The new map of the Antarctic regions published in the *National Geographic Magazine* for October 1932 has many features of interest. The map is on the scale of 1 : 16 M, and though less ambitious than the recent one in four sheets published by the American Geographical Society, it is clear, neatly printed, and up to date in its information. Some of the symbols used deserve comment. The magnetic variation is shown over the whole map by means of short black arrows at each intersection of the graticule lines. It gives the information in a neat form, but perhaps hardly justifies the interference with other detail, especially as it does not purport to be of use for navigation. A much more useful symbol is the method of showing flights by aeroplane by means of a red line showing the route and a small red plane based where desirable on a small red ship. In this way discoveries which have been made from the air are distinguished from those made from ship or sledge journey, a distinction of considerable value. The insets of two flights by Byrd and one by Wilkins are useful, particularly the eastward flight of Byrd when he discovered the Edsel Ford Range. The continent is divided up into four quadrants named respectively American, African, Australian, and Pacific, a much more rational division than the clumsy one of East and West Antarctica.

There are a few minor points calling for remark: the Ross Barrier, for instance, following some recent authorities, is called the Ross Shelf Ice. The term "shelf-ice" was introduced by Nordenskiöld to describe the narrow belt of floating ice on the east coast of Graham Land, where its appearance was sufficiently shelf-like to warrant the term. It is not nearly so suitable to describe sheets which are hundreds of miles wide. In any case, since the Ross Barrier has got into literature and maps under that name it might have been advisable not to change it for that particular case. The supposed land-falls of Wilkes namely, Ringgold Knoll and Cape Hudson, are retained in dotted line, though omitted on the 1/4 M map of the American Geographical Society. The tracks of many ships are printed in red following a tradition for Antarctic charts which is still very useful. The network of routes in the South Atlantic will enable readers, perhaps for the first time, to realize what excellent work the Norwegians have been doing in that sector, mainly through many voyages in the small *Norvegia*. In the last year they have outlined fairly closely nearly half of the gap between Enderby Land and Coats Land; and the remainder will probably be filled in by the bold plan of Captain Riiser-Larsen to sledge along the coast during the next two years. F. D.

BYZANTINE TREATISE ON COSMOLOGY AND GEOGRAPHY

An anonymous Byzantine treatise on these subjects appears to have had considerable vogue in early days, as it still exists in slightly variant form in eight different MSS., for the most part dating from the fifteenth century, lately brought

to light. One of them was discovered in 1912 by M. Armand Delatte while engaged in researches in the Athens libraries. This writer now deals with the ideas of the original author as to the constitution of the Universe and the geography of the World, in a paper printed in the *Bulletin de la Classe des Lettres* of the Royal Academy of Belgium, 1932, Part 6. Whilst largely, as might be expected, a patchwork compilation from the writings of the old Greek philosophers, the treatise shows some originality in points of detail—at least their source cannot be traced by M. Delatte, who shows a thorough knowledge of the ancient texts. In the matter of the conflict between sacred and profane views of the Universe, the author shows considerable independence, often adopting the ideas of the pagan philosophers, and regarding the Bible stories as allegorical. Of the many ancient authors drawn upon, Empedocles seems to have been the authority for several of the views put forward. Some are incorrectly attributed to Plato by the Byzantine, who must have known him only through garbled versions.

The origin of the Universe is here attributed, as by others, to a gravitational separation of the four primary elements. Its form is likened to a barrel (a comparison not met with elsewhere) or an egg, the successive spheres of the Earth and Heavens corresponding to the inner layers of the latter. The Earth is a minute point at the centre of the Universe, and is surrounded on *all* sides by the sky, at a distance of 3,650,000 miles (an estimate which again seems to stand alone). The sky has a rotatory movement, carrying the stars with it. The author rejects alike the notion that the Earth is supported by pillars, and that it floats on water. Nor is he content with the explanation that it floats in air like a feather, but regards it as held in place by the rotation of the sky. The Ocean is a river rising in the east and encircling the Earth by its two arms. Paradise lies 20 miles beyond the eastern end of the world, the nearest approach to it being attributed to St. Macarius. The Isles of the Blessed, in the ocean opposite India, were sighted by one Eusebius Indicopleustes, not mentioned in any other text. Of the four great seas the Red has a greater extension than the actual, the two next are formed by two divisions of the Mediterranean, and the fourth is the Black or Great Sea, which begins at the "Northern Syracuse"—perhaps in the land of the Siraces north of the Caucasus. The pearl oyster lives in the Red Sea, the pearls being its eyes transformed by the action of lightning. Four of the MSS. name twelve principal mountains, one of which again is named Syracusios. Thermal waters and earthquakes are explained on the analogy of the human body and its internal ducts, earthquakes being due to a sudden expulsion of air, as in a sneeze.

The treatise certainly seems to have deserved to be thus rescued from oblivion.

ADMIRAL ARTHUR PHILLIP

On December 7 last H.R.H. Prince George unveiled a memorial on the front of St. Mildred's Church, Bread Street, to Admiral Arthur Phillip, R.N. The memorial, the gift of Lord Wakefield of Hythe, was first suggested by Mr. Douglas Hope Johnston, of Sydney, great-grandson of Colonel George Johnston, A.D.C. to Phillip in 1788. Among the features of the memorial are a bust of Phillip by C. L. Hartwell, R.A., a model of H.M.S. *Supply*, and two panels depicting the fixing of the site and foundation of Sydney on 23 and 26 January 1788. The main inscription reads: "In honour of Admiral Arthur Phillip, R.N., Citizen of London. Founder and first Governor Australia. Born in the Ward of Bread Street 11th October 1738. Entered the Royal Navy 1755 and died 31st August 1814. To his indomitable courage, prophetic vision, forbearance, faith, inspiration and wisdom was due the success of the first settlement in Australia at Sydney on Saturday 26th January 1788."

It will be remembered that when it was decided in 1787 to establish a penal

settlement in New South Wales, on the evidence of Captain Cook's reports, Lord Sydney with rare insight chose Phillip as commander of the fleet, and first Governor-General. On arriving in New South Wales, Phillip decided against the proposed site in Botany Bay, and examined the shores of Port Jackson, where he finally chose Sydney Cove for the settlement. The first years were critical: supplies were short, the men difficult to handle, and the authorities at home unenthusiastic. Phillip's earlier experiences in farming stood him in good stead, and though the colony was on the verge of starvation in 1790, the crisis had passed when he was compelled by ill-health to leave for England in April 1792.

PROFESSOR MASON'S INAUGURAL LECTURE

We have received from the Clarendon Press a copy of Professor Mason's Inaugural Lecture delivered before the University of Oxford on 15 November 1932. Professor Mason chose for his subject "The Geography of Current Affairs," and the whole lecture is characterized by the sense of reality and avoidance of academic jargon at once suggested by such a title. It appears to be the Professor's aim to bring the study of geography at Oxford into line with modern ideas of scientific teaching in general and of the application of science to the present problems of the world in particular.

After disclaiming any intention of heading a revolution, Professor Mason admitted that an Inaugural Lecture should be an occasion for the profession of his geographical faith. Geography was the study of the Earth as the home of Man; and he believed "that the object of our Oxford School of Geography should be to give a sound framework of geographical knowledge, properly fitted together by the study of geographical facts, on which to base our behaviour to the world." Many of our present-day troubles could be traced to neglect of the teachings of geography; and there were few world problems which were without their geographical aspect. We need only consider the basic geographical background of the Ottawa Conference, the facts behind the trouble in Manchuria, the future of the agricultural populations of India, the clash of interests of Denmark and Norway in Greenland—"all problems that the geographer can help to solve."

Having sketched the progress of geography in Oxford, and paid a tribute to the work of Sir Halford Mackinder and of our Society in this respect, the lecturer was disposed to lay repeated emphasis on the need for facts, proved facts, rather than theories ("a theory in the hands of a novice may become dangerous"), and for co-operation with kindred sciences. "Our geographical facts are of use to some of them, and some of their facts are of use to us. I have hinted that the world is discovered; but I doubt whether a hundredth part of the land surface of the globe is surveyed in sufficient detail for modern requirements. If the pioneer's day is nearly over, the specialist-explorer's dawn is only breaking." He appealed to our colonies not to abandon their topographical survey work owing to financial difficulties; for world population figures were mounting, and development must not stand still. "Geographical knowledge is essential before countries can be economically developed, before roads or railways can be economically built, minerals efficiently exploited, or desert areas rendered fertile." Scientific work cannot be stopped and started again by the pressing of a button, but must in the nature of things be continuous.

Professor Mason closed his succinct and straightforward address by an appeal to his brother geographers, in view especially of the growing internationalization of geography, to "poison any jargon that shows itself in our midst. The best books on geography are those that are clear and unadorned. . . . Let us not hide our knowledge behind a woolly fleece of words. . . . Let us be precise about our facts." After reading this pronouncement of policy by its first Professor,

geographers in all parts of the world will watch the future development of the Oxford School of Geography with renewed interest.

BIBLIOGRAPHIE GÉOGRAPHIQUE INTERNATIONALE 1931

The 'Bibliographie Géographique Internationale 1931 (XLI[e] Bibliographie annuelle)'—the new title of the geographical bibliography published by the "Association de Géographes Français"—is now ready, and orders should be sent as soon as possible to the office of the Society. As the exchange remains unfavourable, the special price for the British Isles and the Dominions has been fixed at 13*s* 6*d* post free, if ordered through the Society. The volume for 1930 may be obtained at 12*s* 6*d* post free, and earlier volumes (1927–29) at 8*s* 6*d* post free while the stock lasts. The change of title noted above was made as the outcome of discussion at the International Geographical Congress at Paris in 1931. The hope was also expressed that the number of co-operating bodies would increase. Though this has not been realized, many more nationalities are represented in the list of contributors, who now number one hundred and three. The volume for 1931 is the largest yet issued, containing 574 pages of bibliography and notes, and an author index of 32 pages. The number of entries, 2898, is not a true guide to its comprehensiveness, as some entries contain as many as twenty bibliographical items. The value of this work is gradually becoming more widely recognized in this country, but further subscribers are required to justify the continuation of the Society's support.

OBITUARY

EDWIN RUTHVEN HEATH, A.M., M.D.

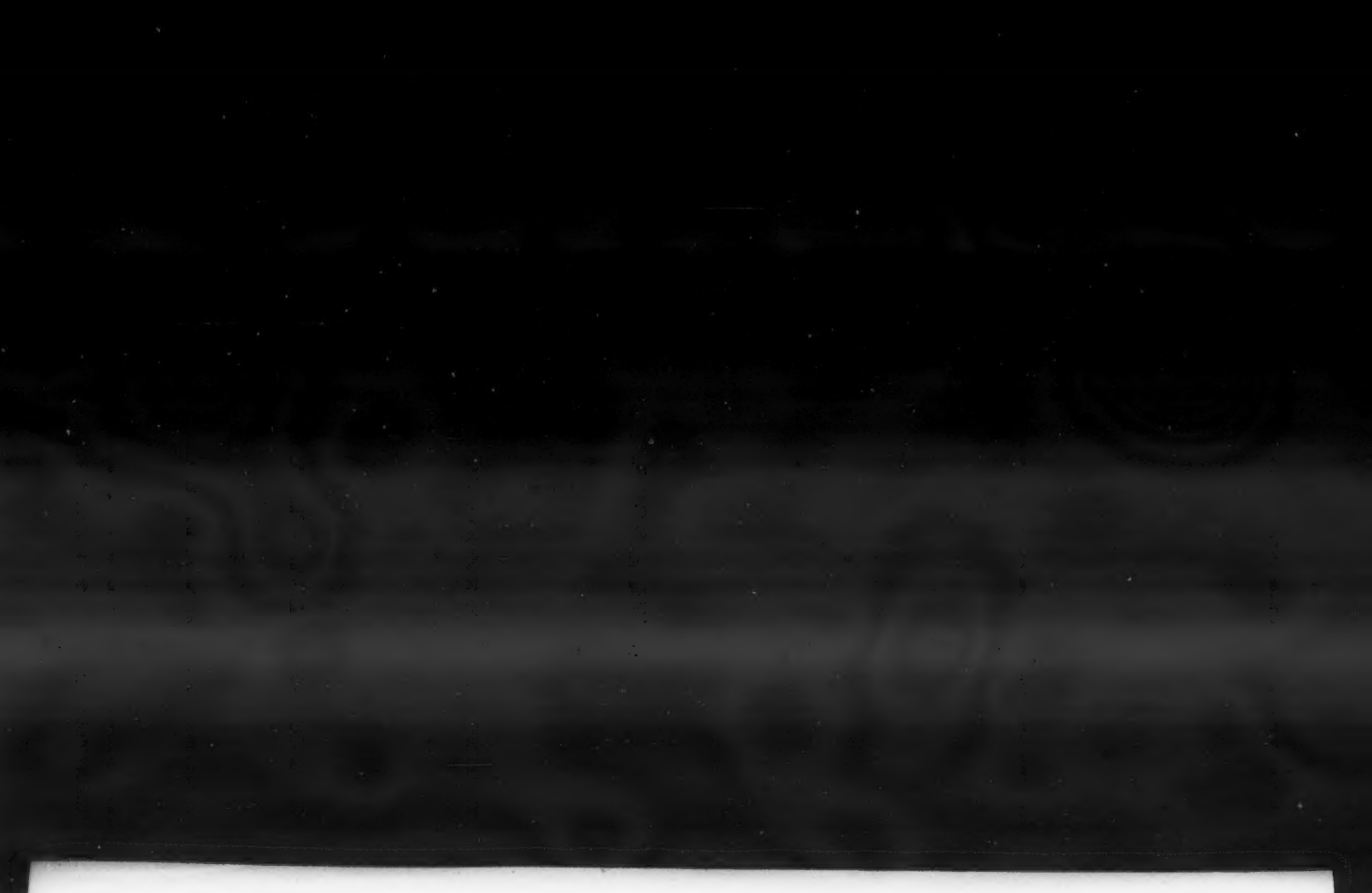
We record with deep regret the death on 27 October last of Dr. E. R. Heath, at the age of ninety-three. Dr. Heath was prominent in Bolivian exploration in the early eighties for his complete survey of the river Beni, an important tributary of the Madeira, then but partially known. After working as an engineer and doctor in Peru and on the Madeira–Mamoré railway, he planned and carried out at his own expense, in the face of great difficulties, a descent of the Beni from near Reyes to its junction with the Mamoré, and later an ascent from Reyes to La Paz. He gave an account of these journeys in the *Proceedings*, New Series, vol. v (1883). This pioneer work gave a great impetus to the rubber industry in Bolivia: to mark their appreciation, the Bolivian Government named a large tributary of the Madre de Dios, newly discovered by Colonel Pando, the Rio Heath. In 1925, membership of the "Order of the Condor," founded to commemorate the centenary of Bolivian independence, was conferred upon him. The Rio Heath was surveyed by Colonel P. H. Fawcett in 1910, and his survey was later accepted in the demarcation of the Peru–Bolivia boundary, which it had been agreed should run to the western source of the Heath and down that river. Mr. Heath was elected Honorary Corresponding Member of the Society in 1883, thus sharing with Prince Teano the distinction of being senior in that list. He settled later in Kansas City, where he acted as Bolivian Consul.

MEETINGS: SESSION 1932-1933

Fifth Evening Meeting, 9 January 1933. The President in the Chair

Elections: Mrs. Katharine Bingley; John Charles Blackater, Junr., F.Z.S.; The Rev. Frederick James Brabyn; The Rev. Reginald Wilton Bullock, M.A.; Anthony Bernard Butler; Miss Joan Mary Eunice Crawshaw; John J. P. Curnow; William Gordon East, M.A.; Arthur John Hawes Elverson; Miss Mary D. Glynn; Arthur Norman Harris, M.A.; Lieut. Alan David Hastings Jay, R.N.; Zafar Husain Khan, B.A.; Capt. Charles Beverley Robinson Macdonald; Rowland Marindin Minns; Capt. Stanley J. Oakshott; David Joseph Ryan; Gilbert Stephenson; Christopher Hugh Sykes; Miss Harriet Grace Wanklyn; The Rev. Horace Godfrey Watts; Mortimer Elliott Webb; Miss Olga Lesley Whitlow, B.SC.

Paper: The Cambridge Expedition to Vatnajökull, 1932. By Mr. Brian Roberts

Third Afternoon Meeting, 16 January 1933. The President in the Chair

Paper: Meteorite Craters as Topographical Features of the Earth's Surface. By Dr. L. J. Spencer